



Weatherford

**COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG**

COMPANY		GRAND MESA OPERATING COMPANY			
WELL		CRATER LAKE #1-8			
FIELD		WILDCAT			
PROVINCE/COUNTY		LINCOLN			
COUNTRY/STATE		U.S.A. / COLORADO			
LOCATION		1145' FNL & 1934' FEL			
SEC 8	TWP 8S	RGE 54W	Other Services		MSS
Latitude		MAI/MFE			
Longitude					
API Number		05-073-06738			
Permanent Datum GL, Elevation 5404 feet					Elevations: KB 5423.00 DF 5421.00 GL 5404.00
Log Measured From KB, 19.00 feet above Permanent Datum					
Drilling Measured From KB					
Date	29-APR-2018				
Run Number	ONE				
Service Order	4558-212189226				
Depth Driller	8495.00				feet
Depth Logger	8496.00				feet
First Reading	8462.00				feet
Last Reading	441.00				feet
Casing Driller	441.00				feet
Casing Logger	441.00				feet
Bit Size	7.875				inches
Hole Fluid Type	CHEMICAL				
Density / Viscosity	9.40 lb/USg		91.00 CP		
PH / Fluid Loss	11.00		7.20 ml/30Min		
Sample Source	FLOWLINE				
Rm @ Measured Temp	0.94 @ 75.0		ohm-m		
Rmf @ Measured Temp	0.75 @ 75.0		ohm-m		
Rmc @ Measured Temp	1.13 @ 75.0		ohm-m		
Source Rmf / Rmc	CALC	CALC			
Rm @ BHT	0.37 @189.0		ohm-m		
Time Since Circulation	6 HOURS				
Max Recorded Temp	189.00		deg F		
Equipment / Base	13096	LIB			
Recorded By	ADAM SILL				
Witnessed By	KENT MATSON				

Elevations:	feet
KB	5423.00
DF	5421.00
GL	5404.00

BOREHOLE RECORD

Last Edited: 29-APR-2018 12:41

Bit Size inches	Depth From feet	Depth To feet
7.875	441.00	8495.00

CASING RECORD

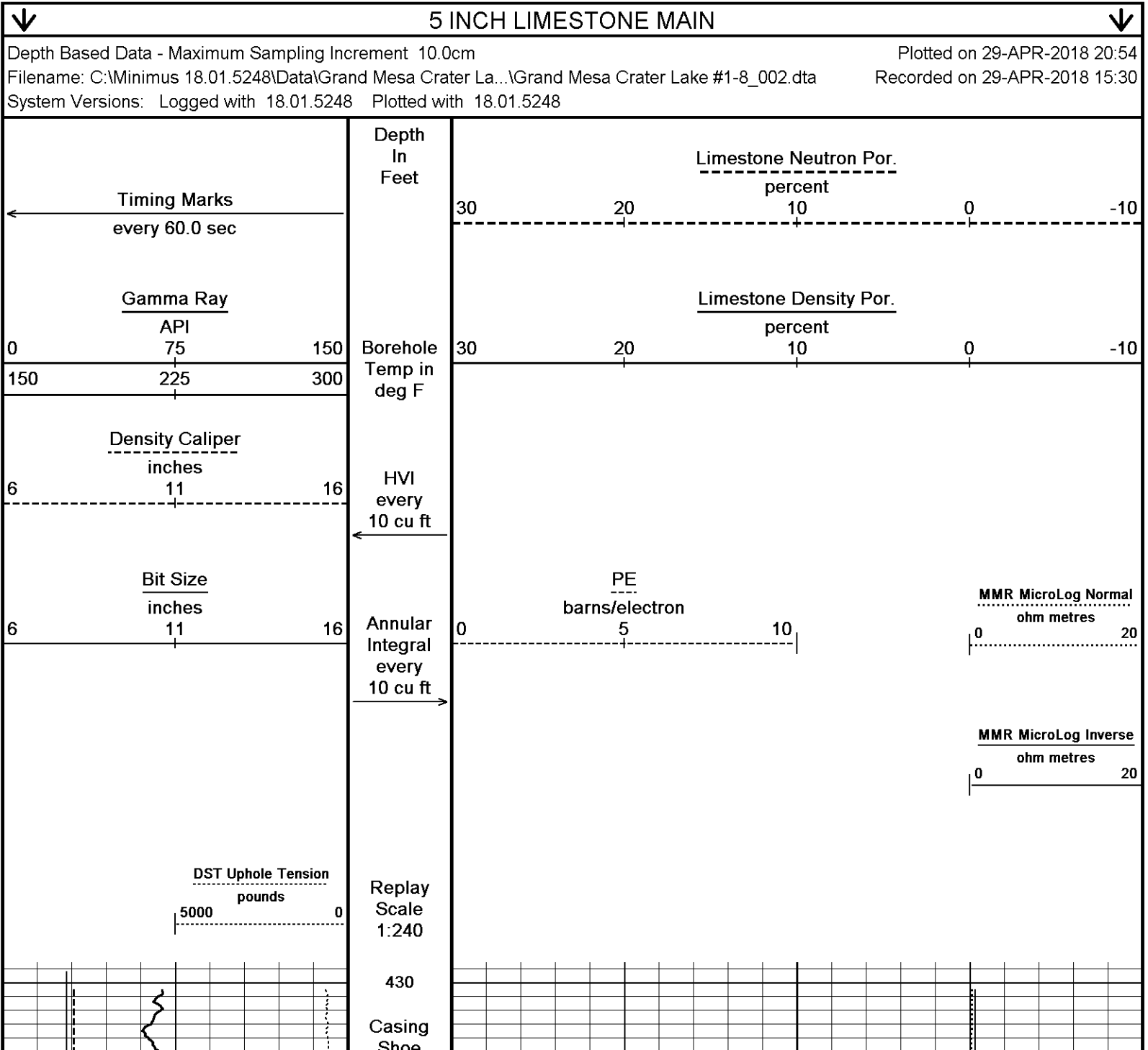
Type	Size inches	Depth From feet	Shoe Depth feet	Weight pounds/ft
SURFACE	8.625	0.00	441.00	24.00

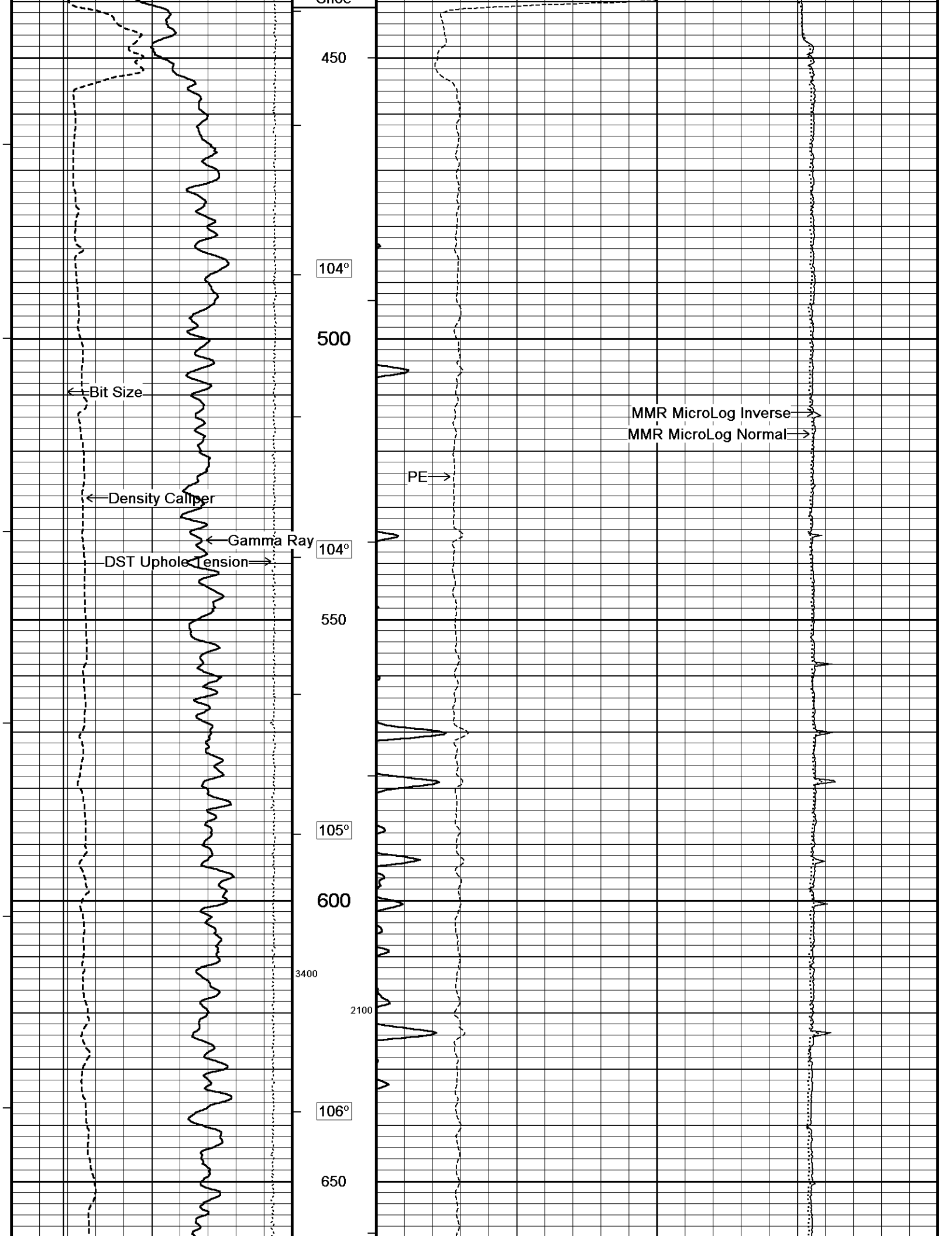
REMARKS

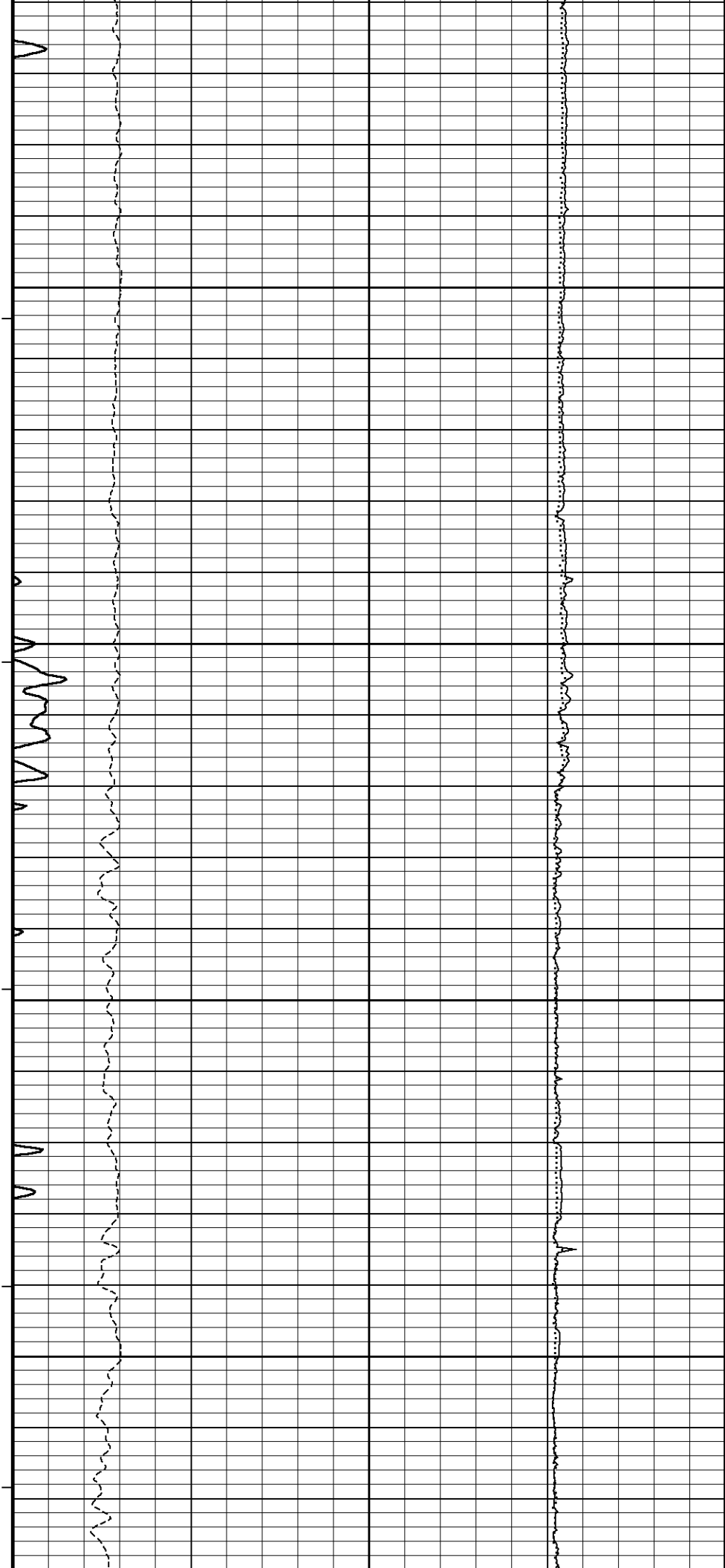
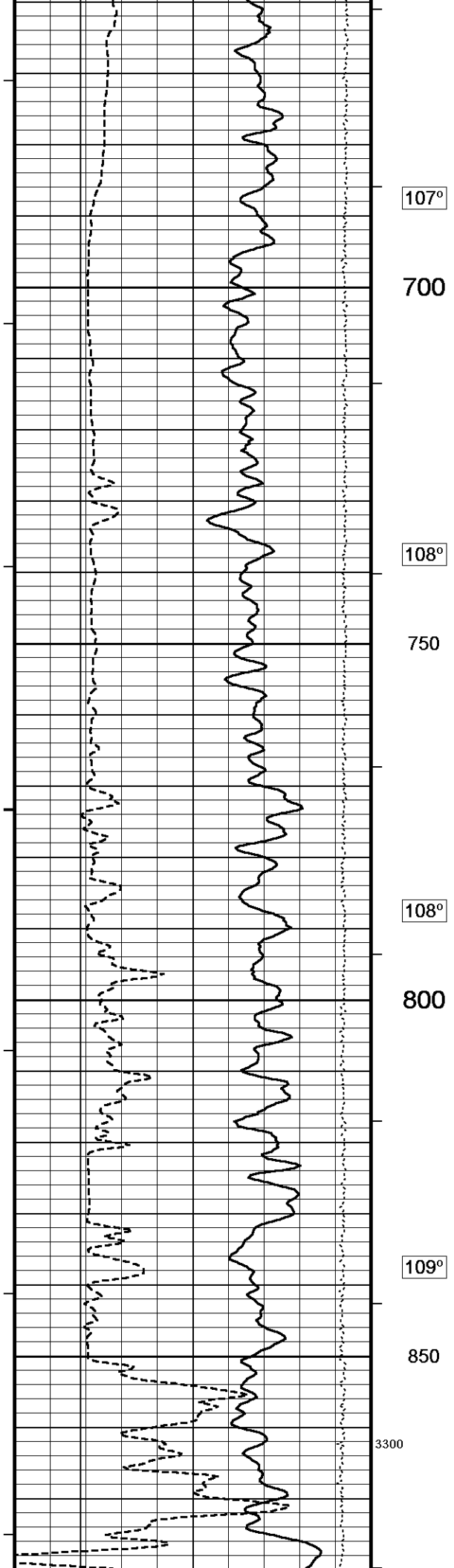
- SOFTWARE ISSUE: WLS 18.01.5248.
- RUN ONE: MCG, MML, MDN, MPD, MFE, MSS, MAI RUN IN COMBINATION.
 - HARDWARE: DUAL BOWSPRING USED ON MDN.
 - 0.5 INCH STANDOFF USED ON MFE.
 - TWO 0.5 INCH STANDOFFS USED ON MSS.
 - 0.5 INCH STANDOFF USED ON MAI.
- 2.71 G/CC LIMESTONE DENSITY MATRIX USED TO CALCULATE POROSITY.
- BOREHOLE RUGOSITY, TIGHT PULLS, AND WASHOUTS WILL AFFECT DATA QUALITY.
- ALL INTERVALS LOGGED AND SCALED PER CUSTOMER'S REQUEST.
- TOTAL HOLE VOLUME FROM TD TO SURFACE CASING: 3470 CU.FT.
- ANNULAR HOLE VOLUME WITH 5.5 INCH PRODUCTION CASING FROM TD TO SURFACE CASING: 2142 CU.FT.

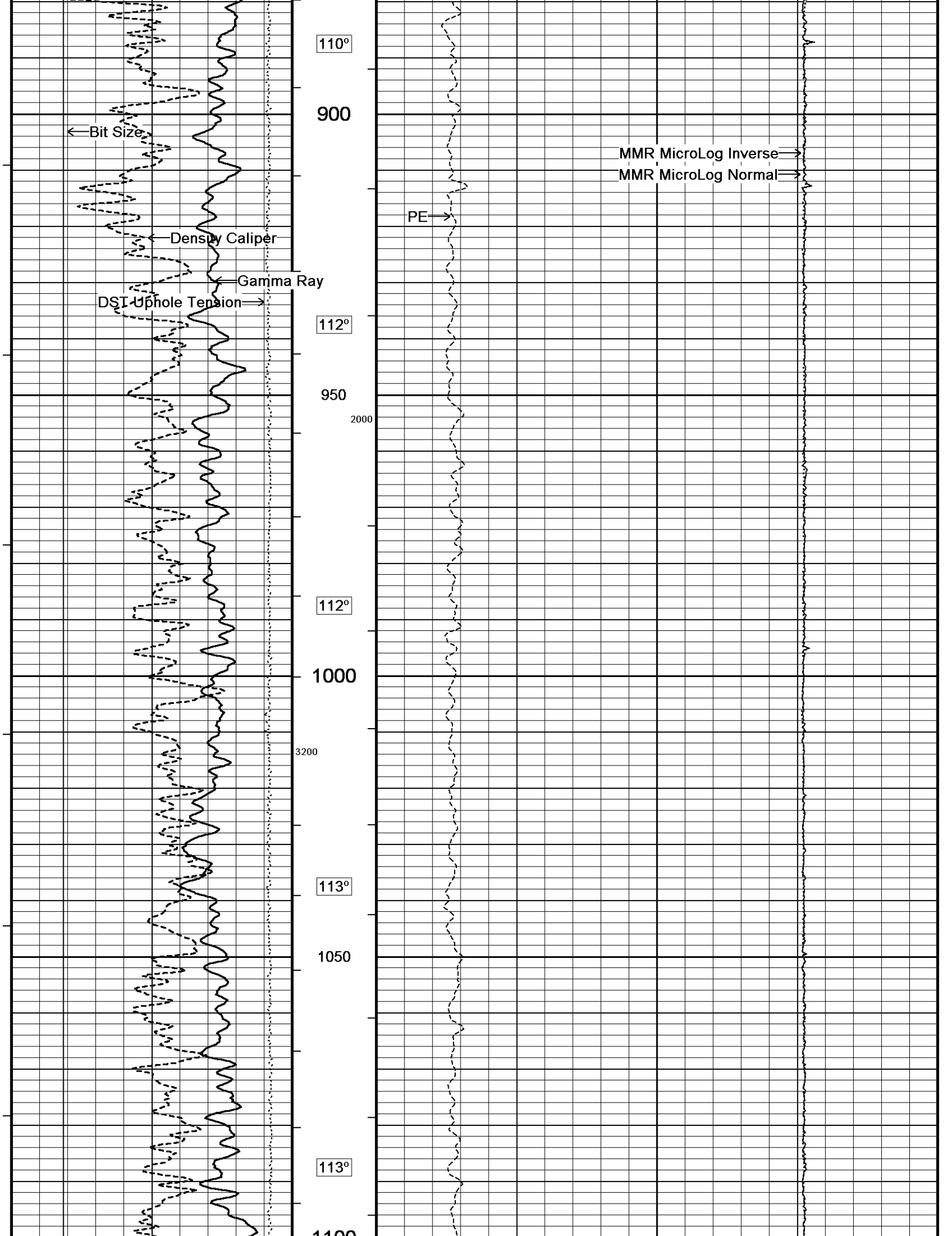
- RIG: WW DRILLING #20.
- ENGINEER: A. SILL.
- OPERATOR: B. TOVAR, J. FOWLER.

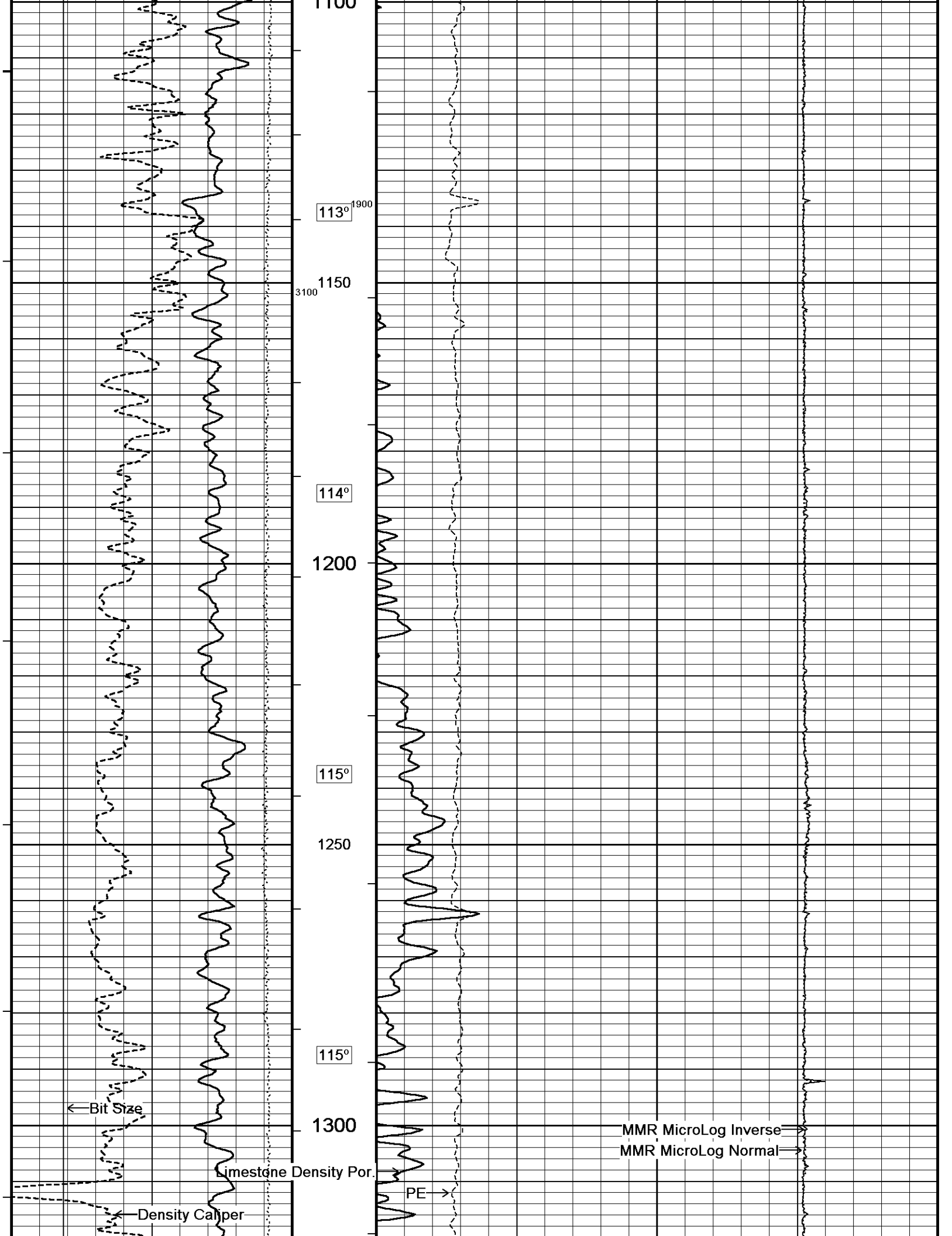
In interpreting, communicating or providing information and/or making recommendations, either written or oral, as to logs or test or other data, type or amount of material, or Work or other service to be furnished, or manner of performance, or in predicting results to be obtained, the Contractor will give the Company the benefit of the Contractor's best judgment based on its experience and will perform all such Work in a good and workmanlike manner. Any interpretation of test or other data, and any recommendation or reservoir description based upon such interpretations, are opinions based upon inferences from measurements and empirical relationships and assumptions, which inferences and assumptions are not infallible, and with respect to which professional engineers and analysts may differ. ACCORDINGLY ANY INTERPRETATION OR RECOMMENDATION RESULTING FROM THE SERVICES WILL BE AT THE SOLE RISK OF THE COMPANY, AND THE CONTRACTOR CANNOT AND DOES NOT WARRANT THE ACCURACY, CORRECTNESS OR COMPLETENESS OF ANY SUCH INTERPRETATION OR RECOMMENDATION, WHICH INTERPRETATIONS AND RECOMMENDATIONS SHOULD NOT, THEREFORE, UNDER ANY CIRCUMSTANCES BE RELIED UPON AS THE SOLE OR MAIN BASIS FOR ANY DRILLING, COMPLETION, WELL TREATMENT, PRODUCTION OR FINANCIAL DECISION, OR ANY PROCEDURE INVOLVING ANY RISK TO THE SAFETY OF ANY DRILLING ACTIVITY, DRILLING RIG OR ITS CREW OR ANY OTHER INDIVIDUAL. THE COMPANY HAS FULL RESPONSIBILITY FOR ALL DECISIONS CONCERNING THE SERVICES.

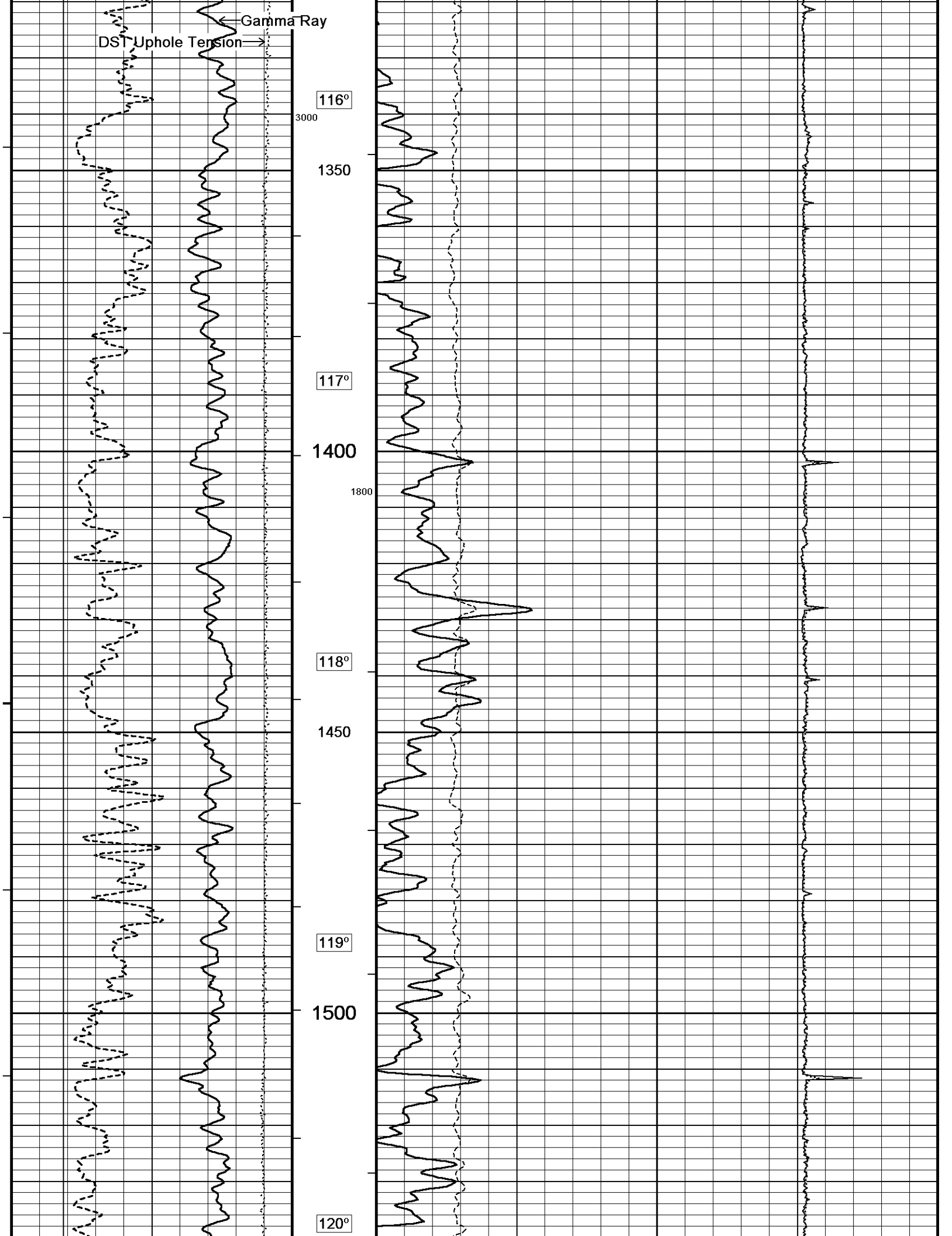


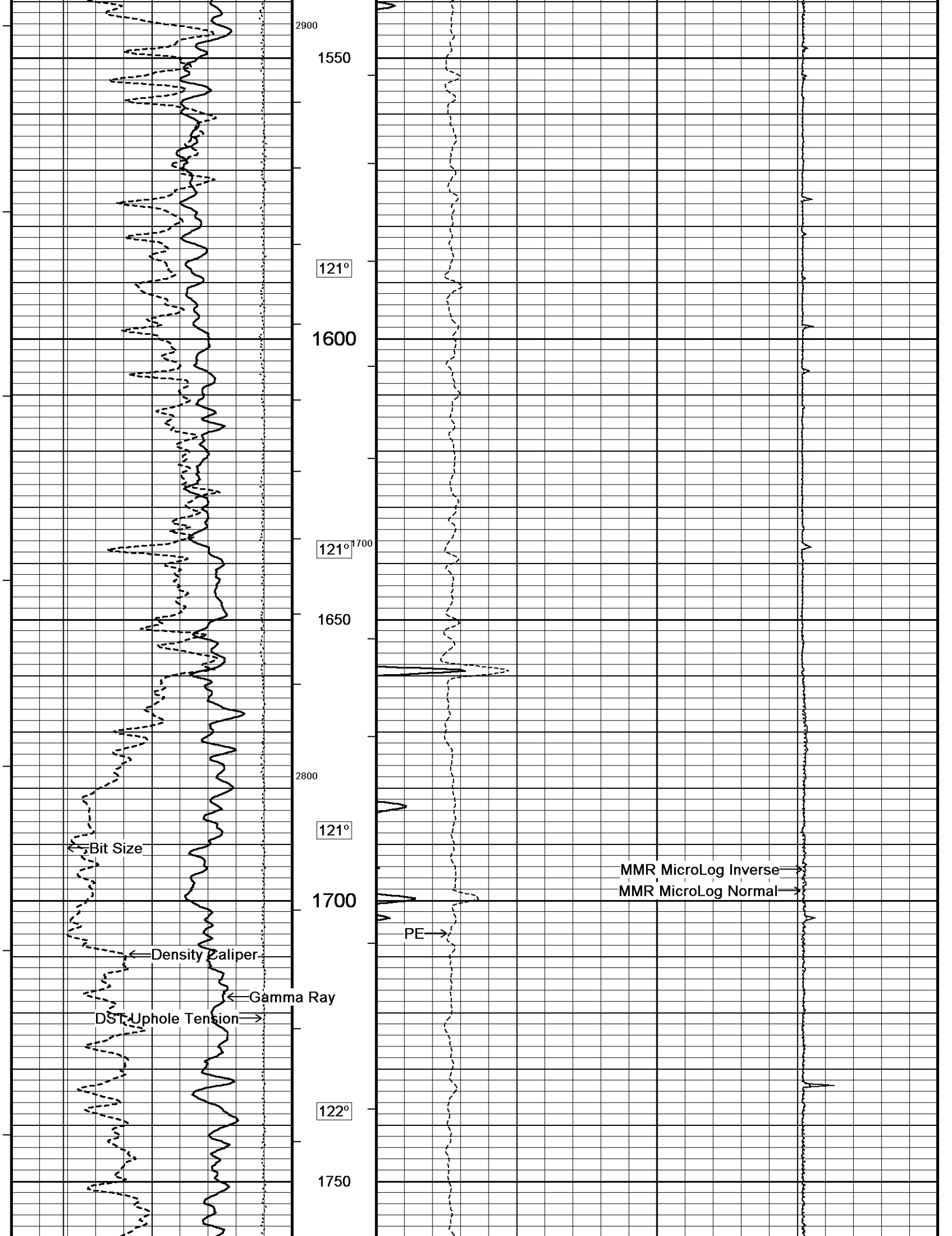


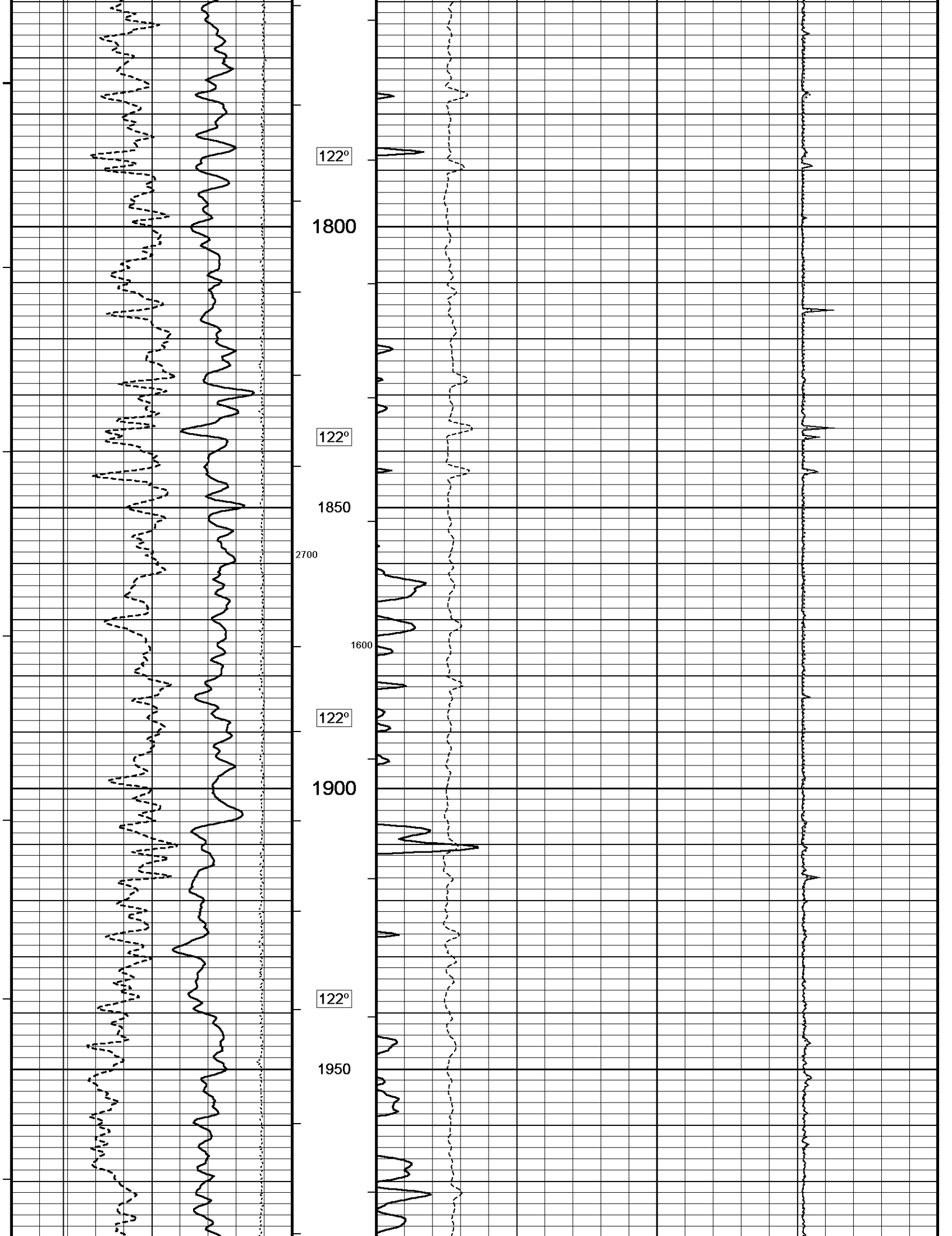


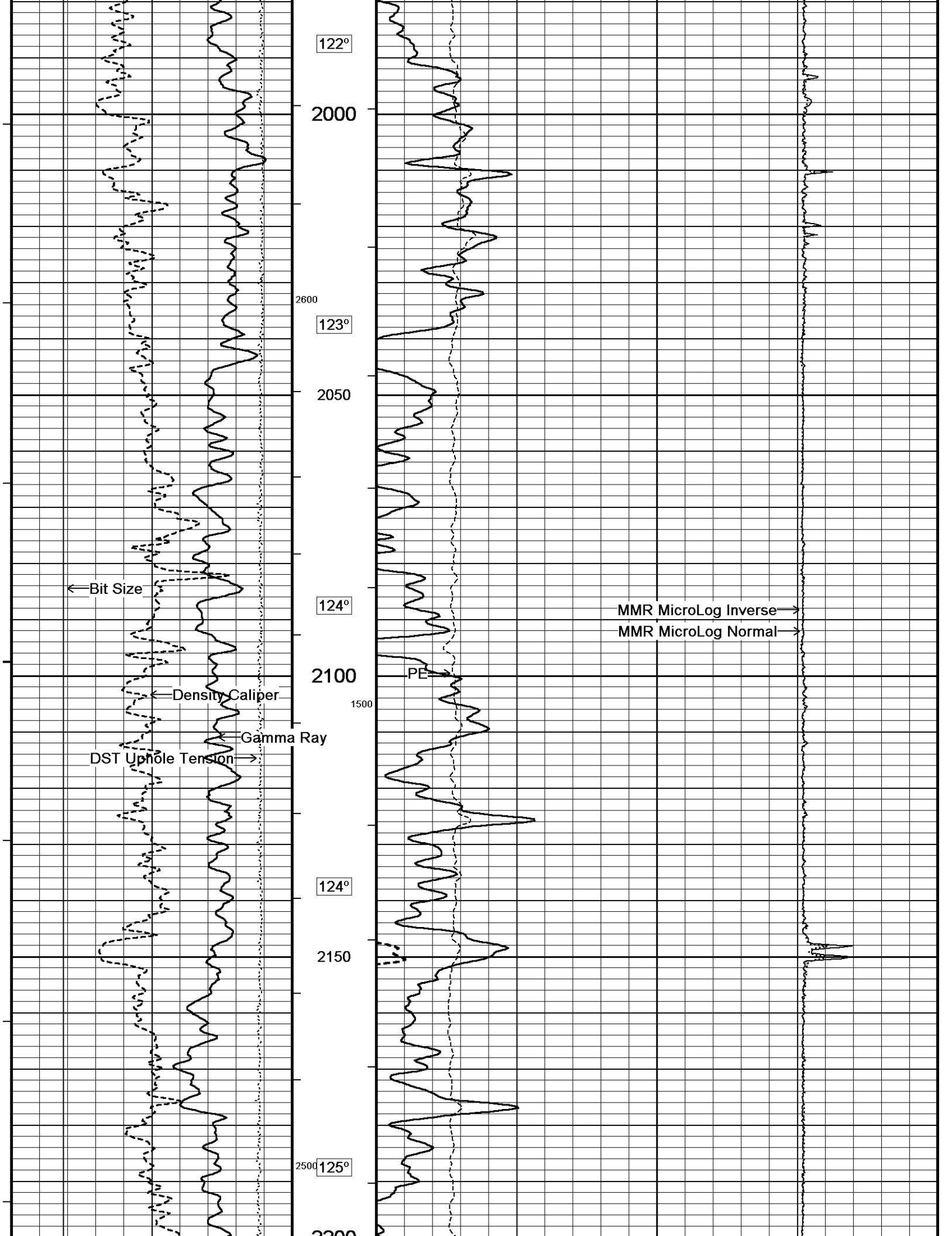


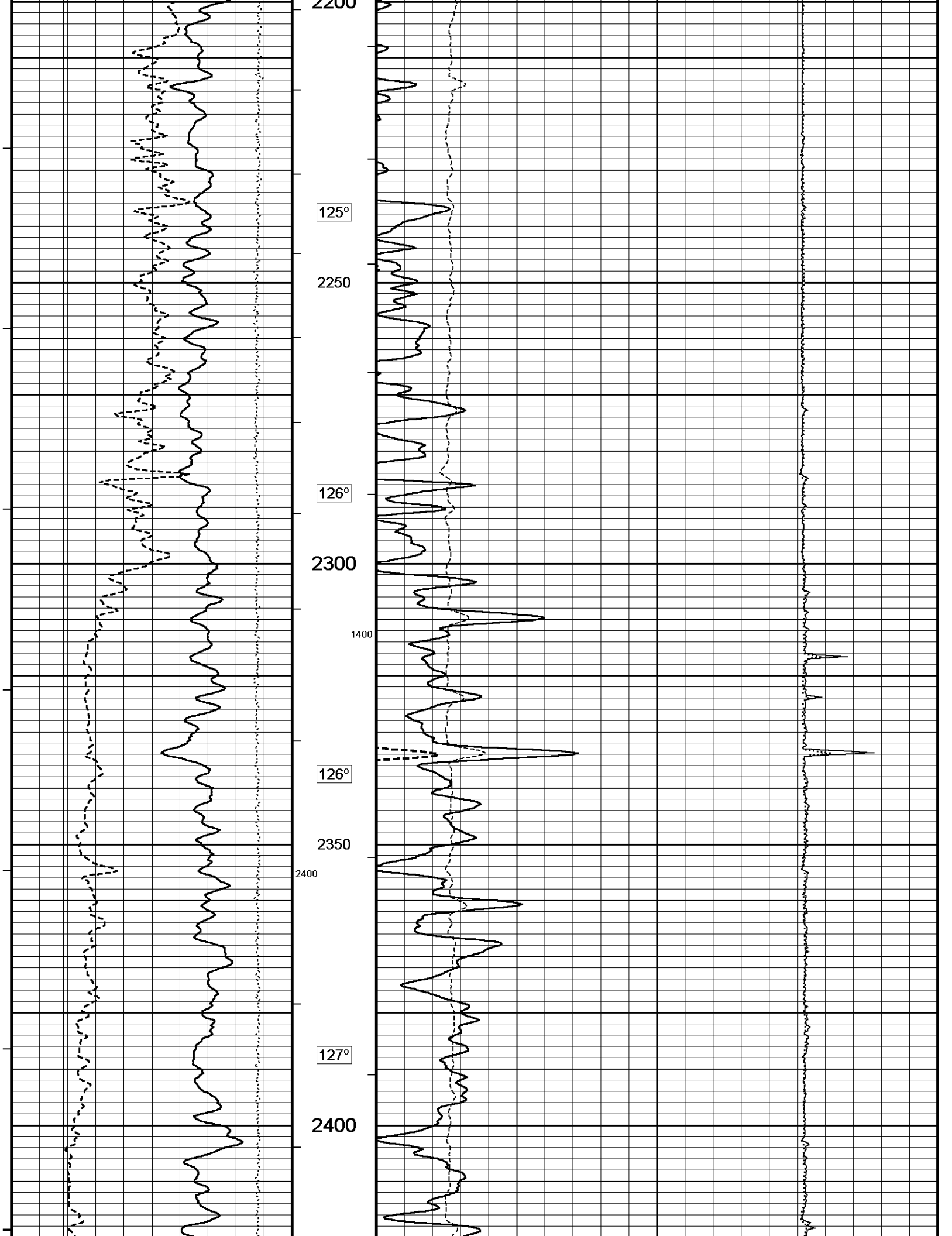


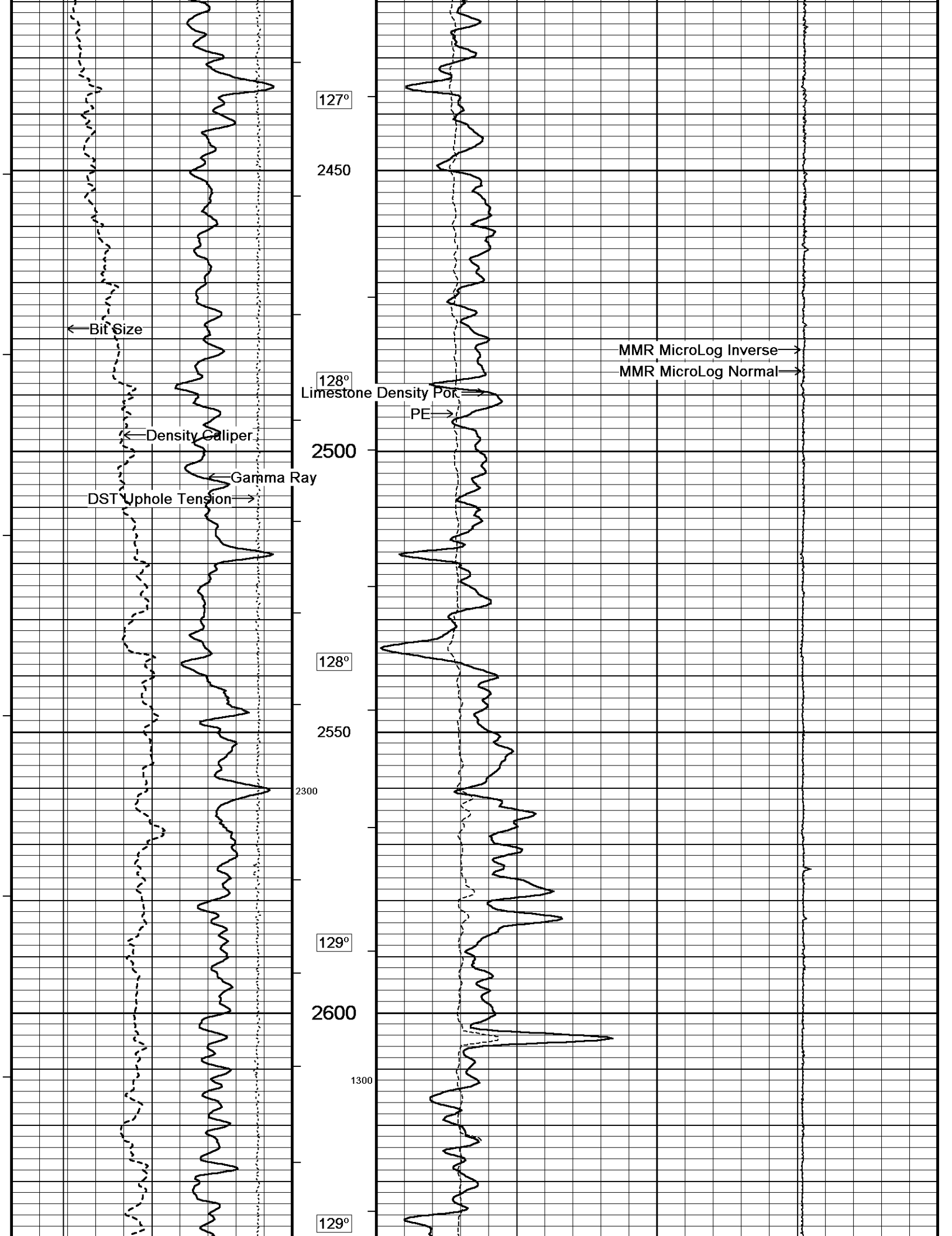


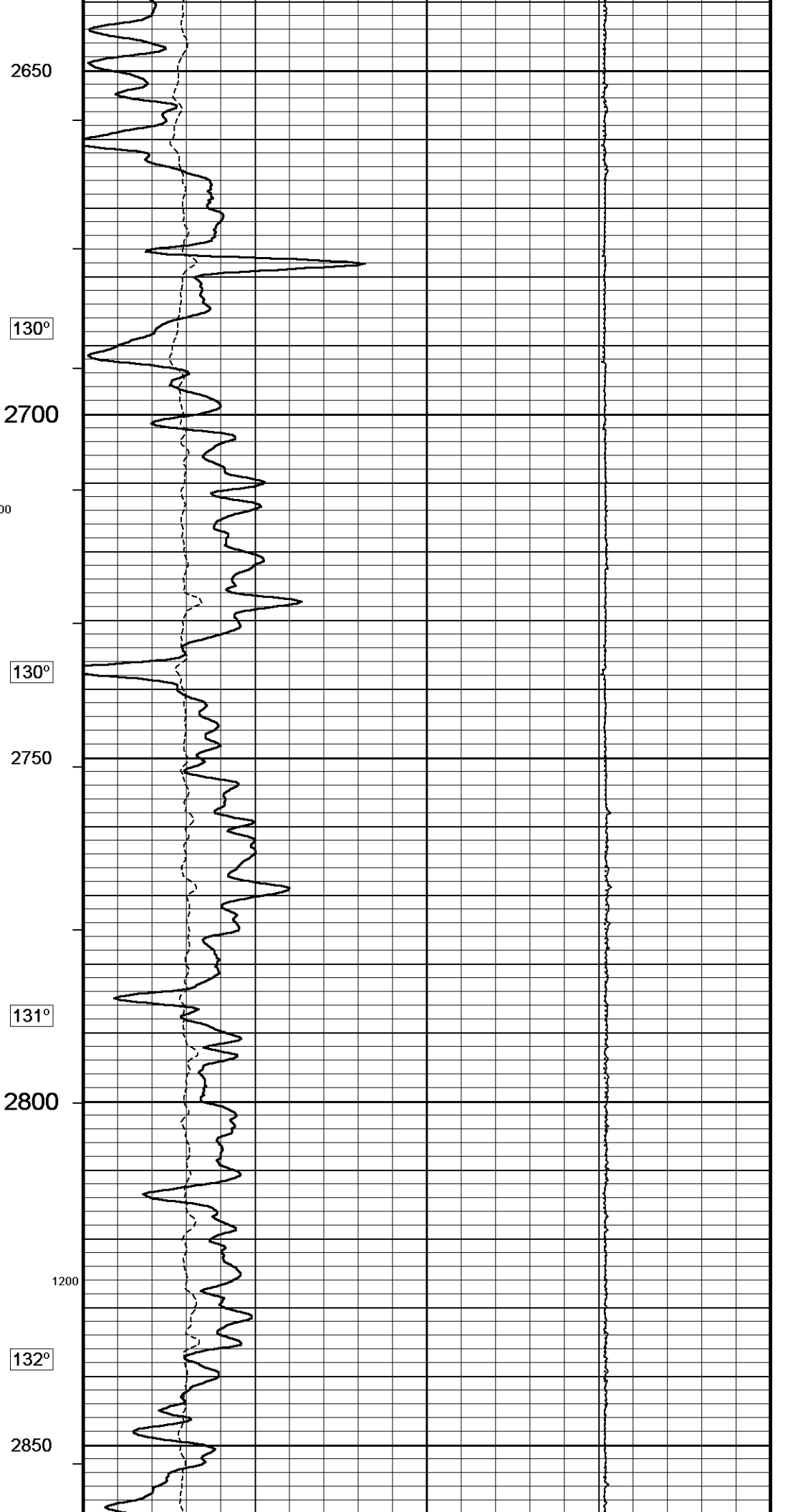
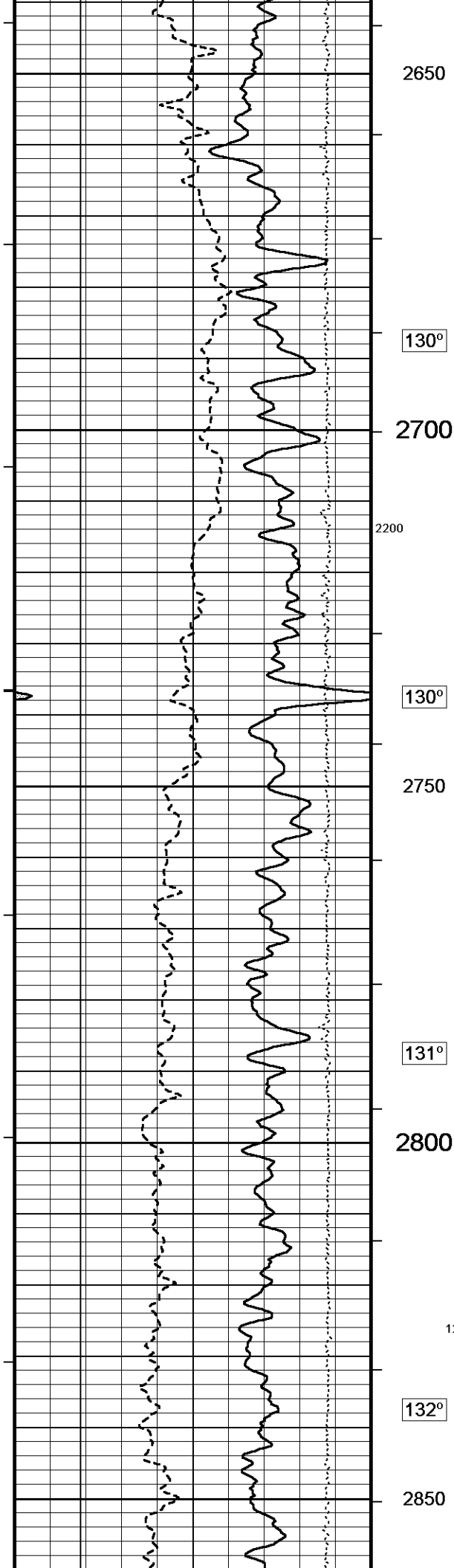


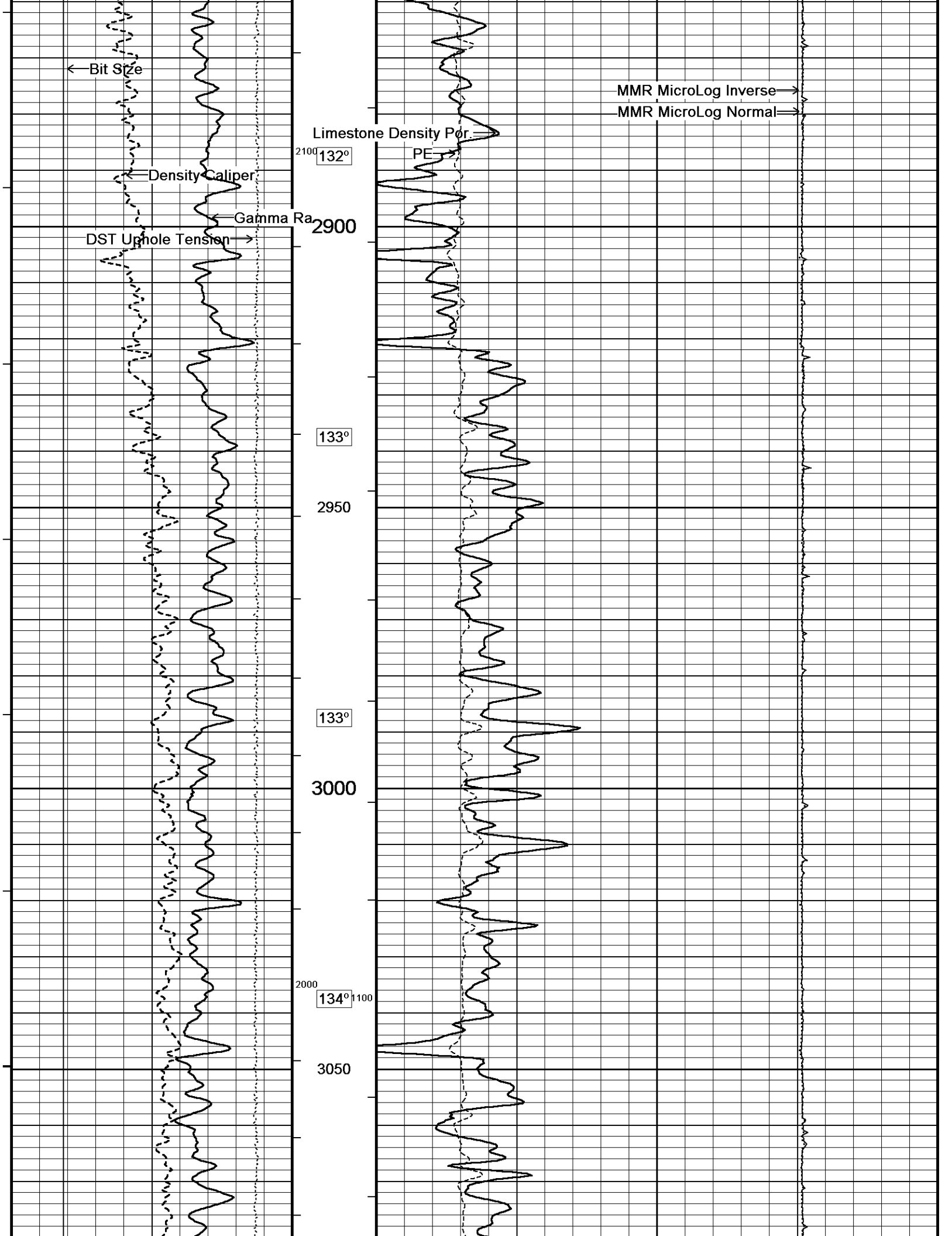


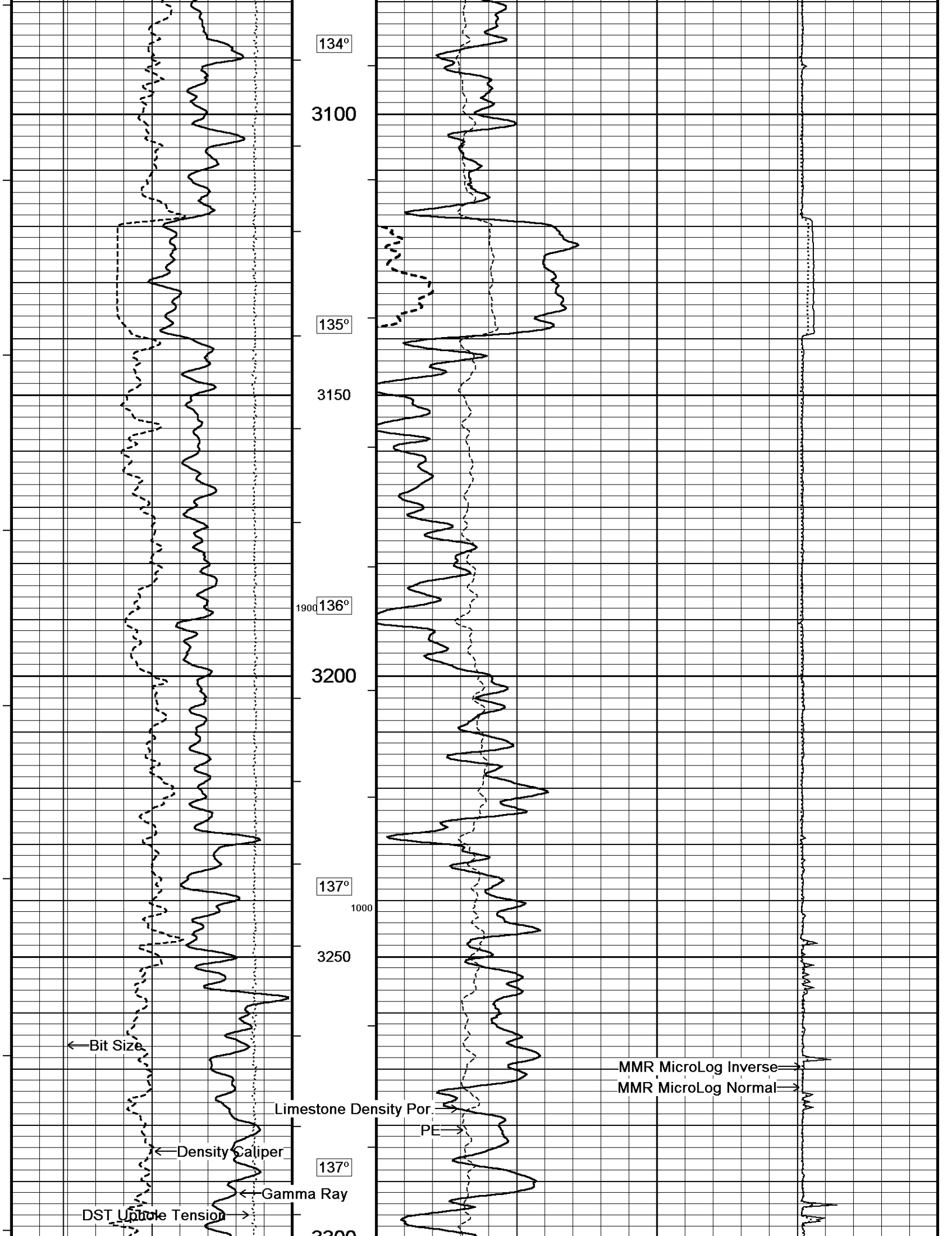


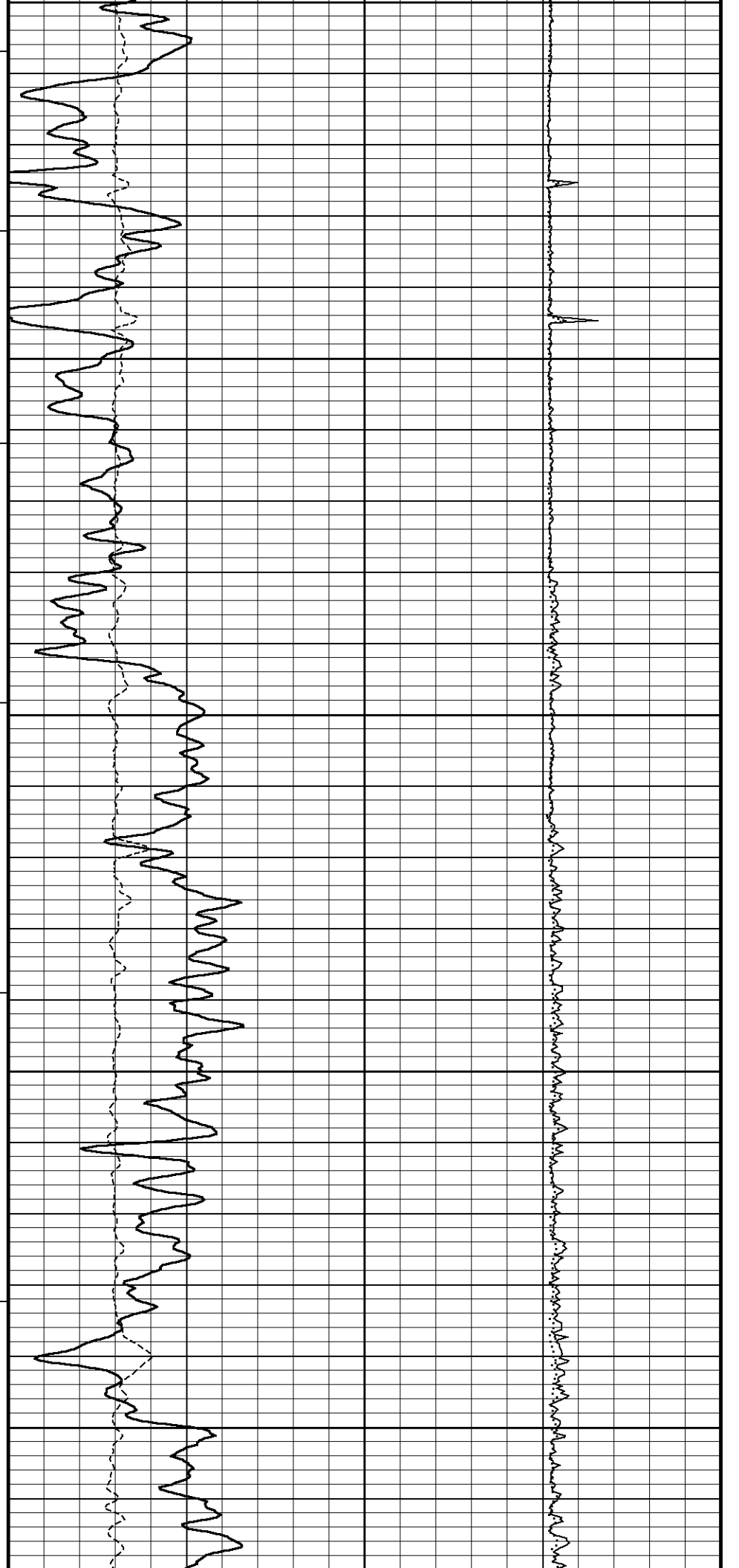
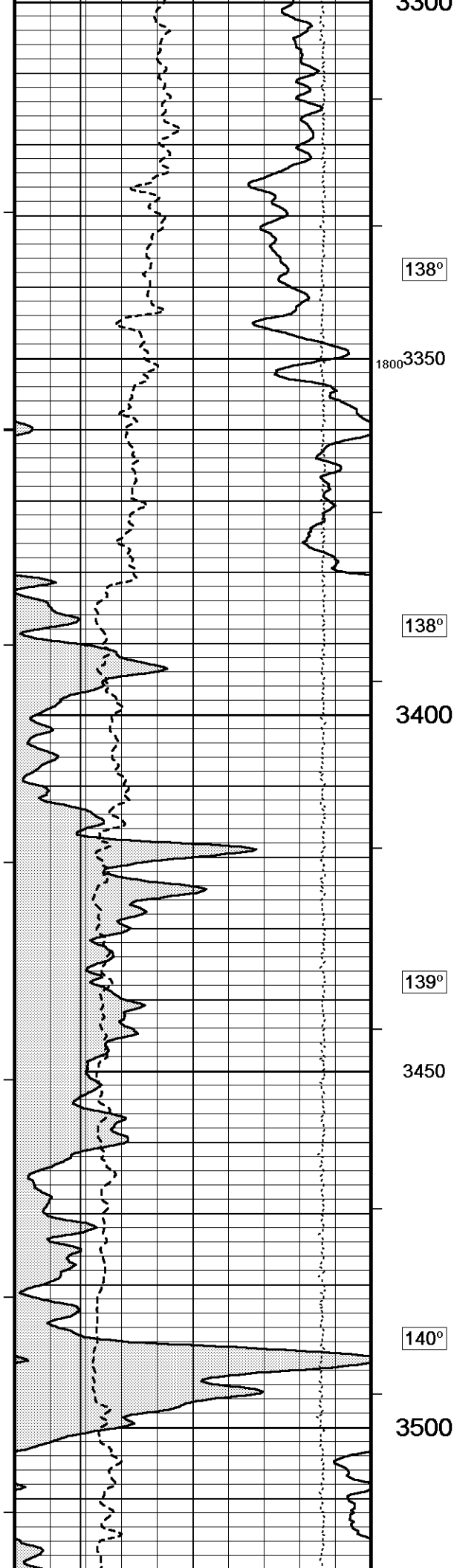


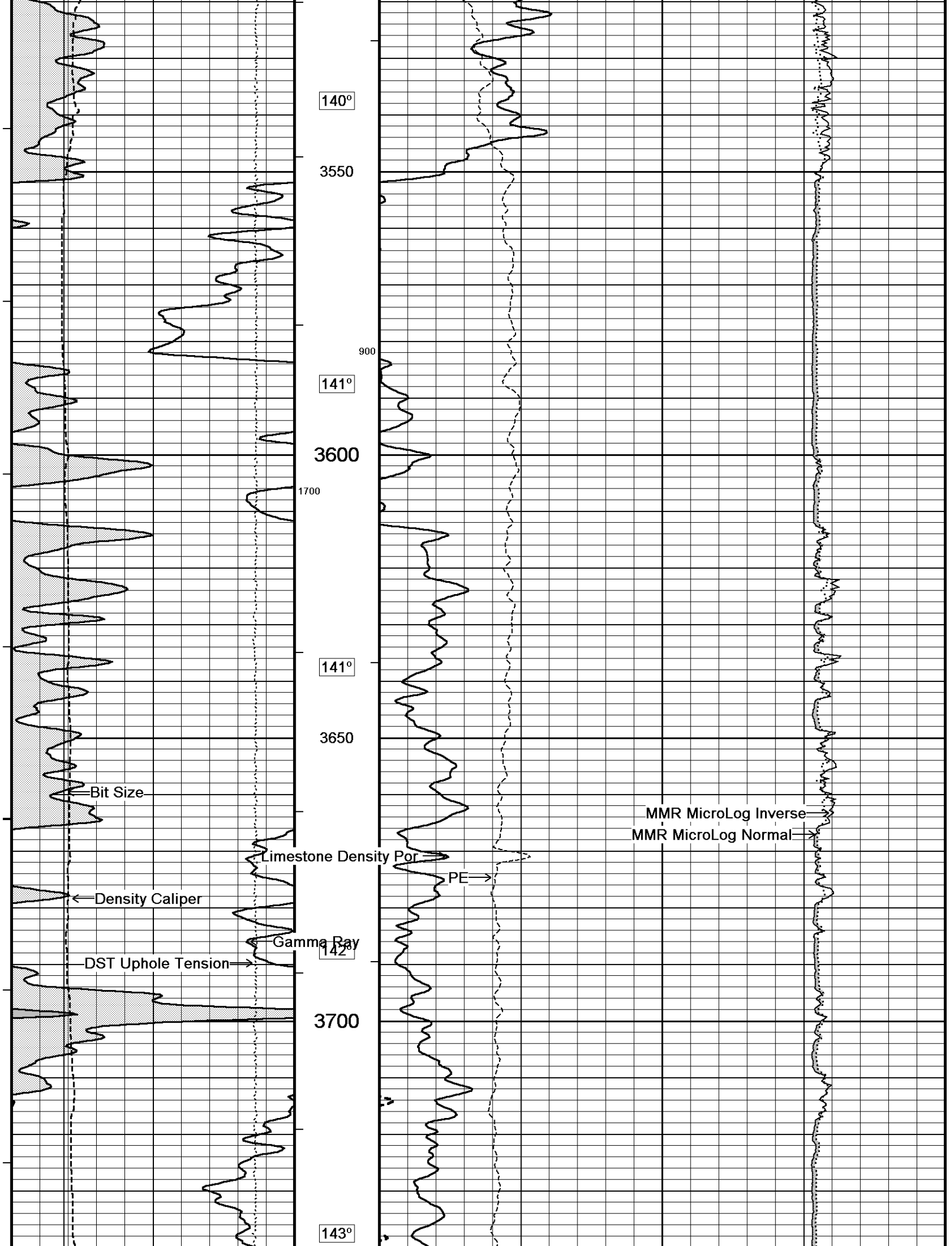


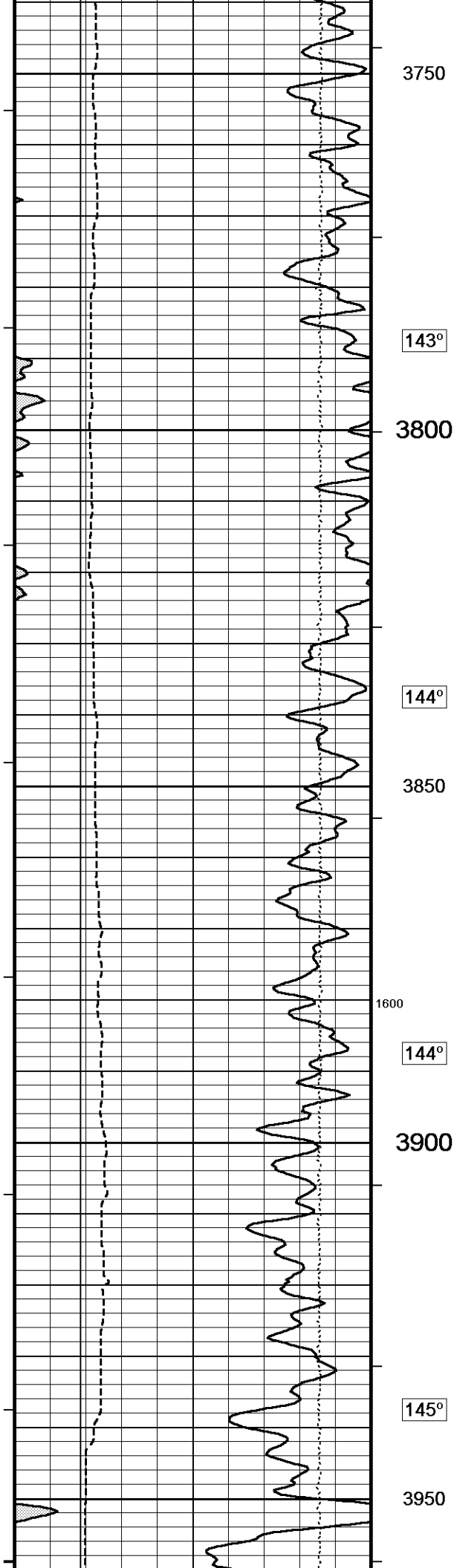












3750

143°

3800

144°

3850

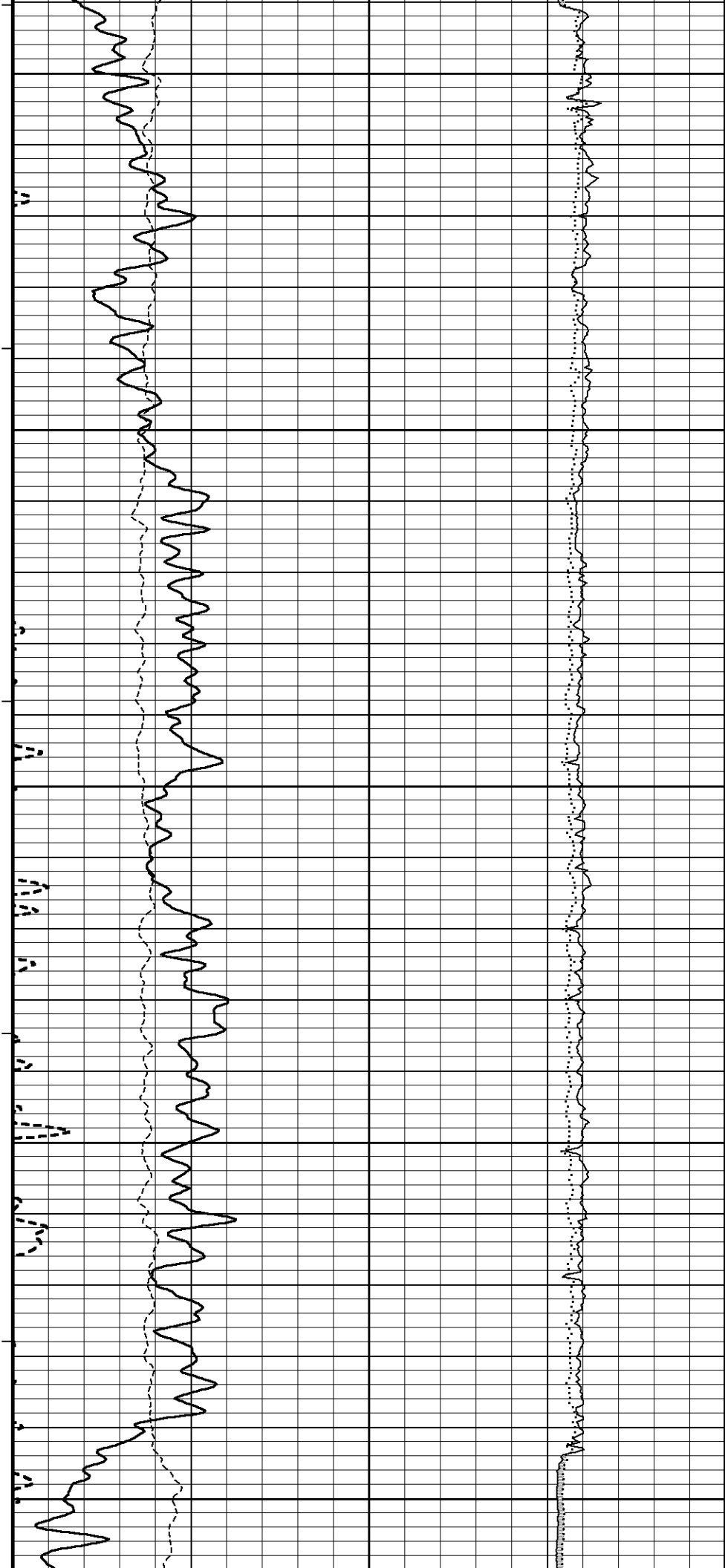
1600

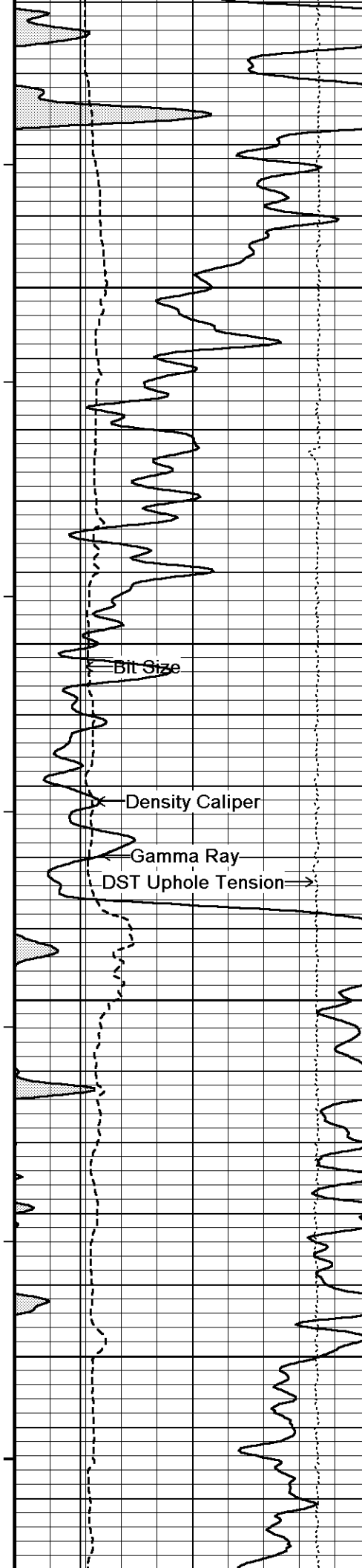
144°

3900

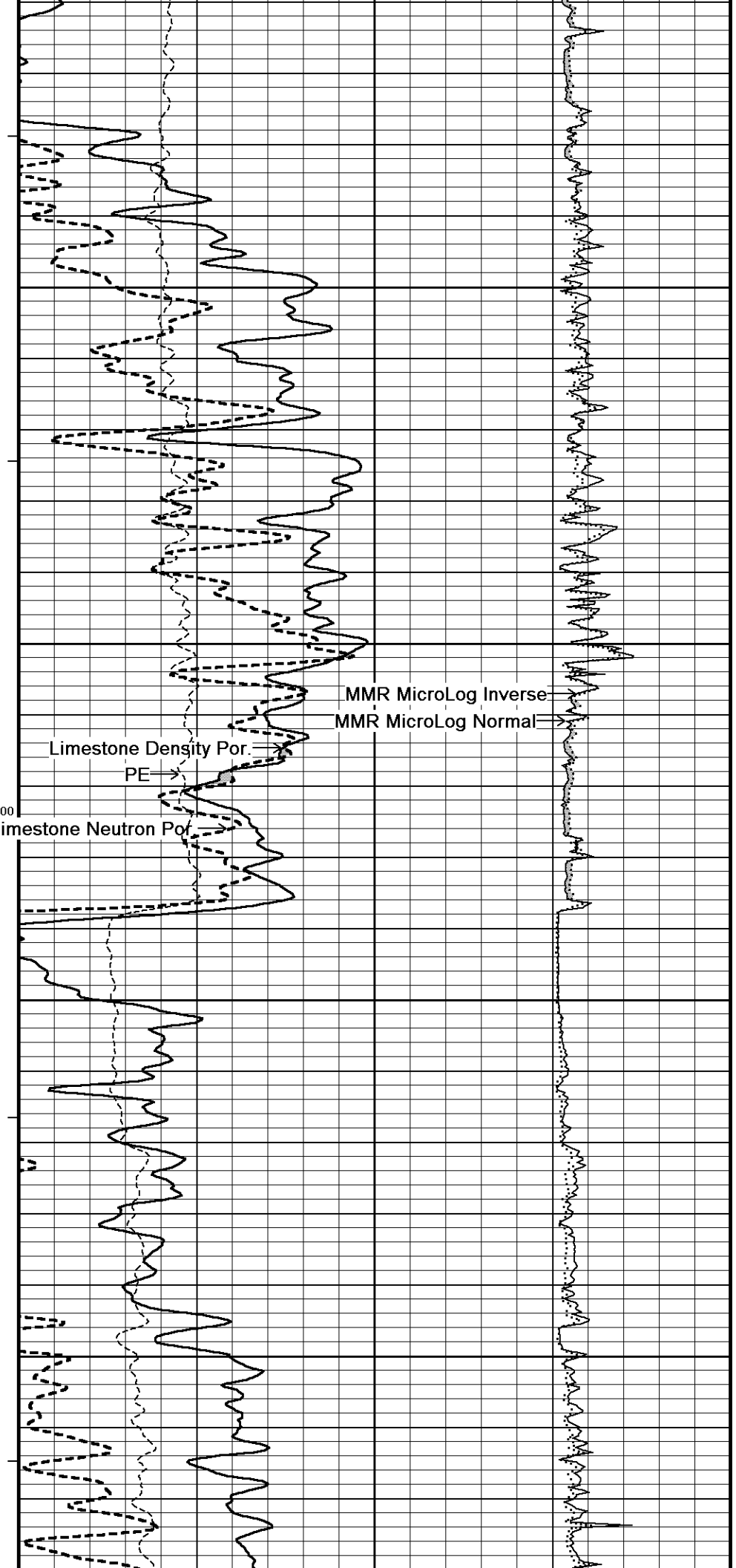
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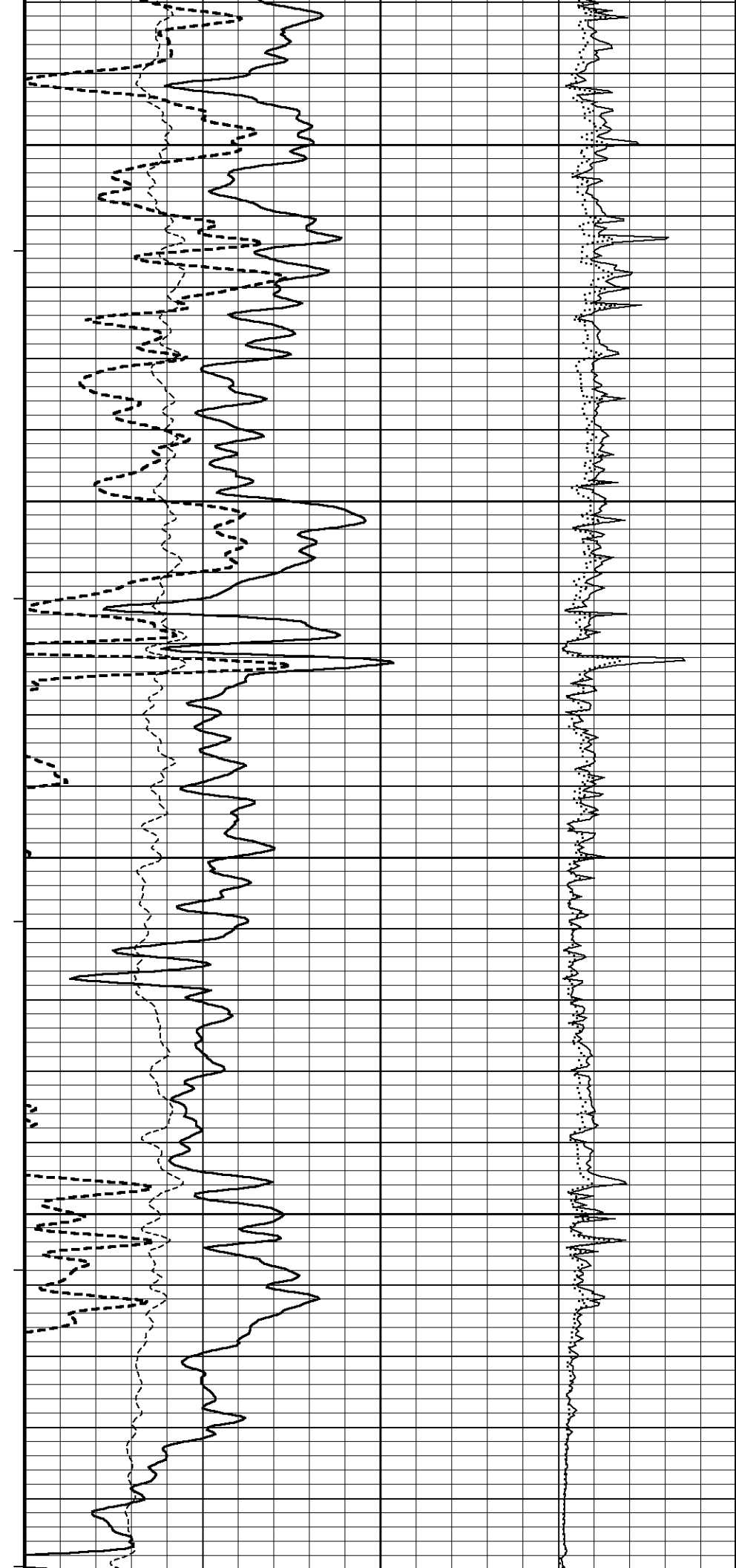
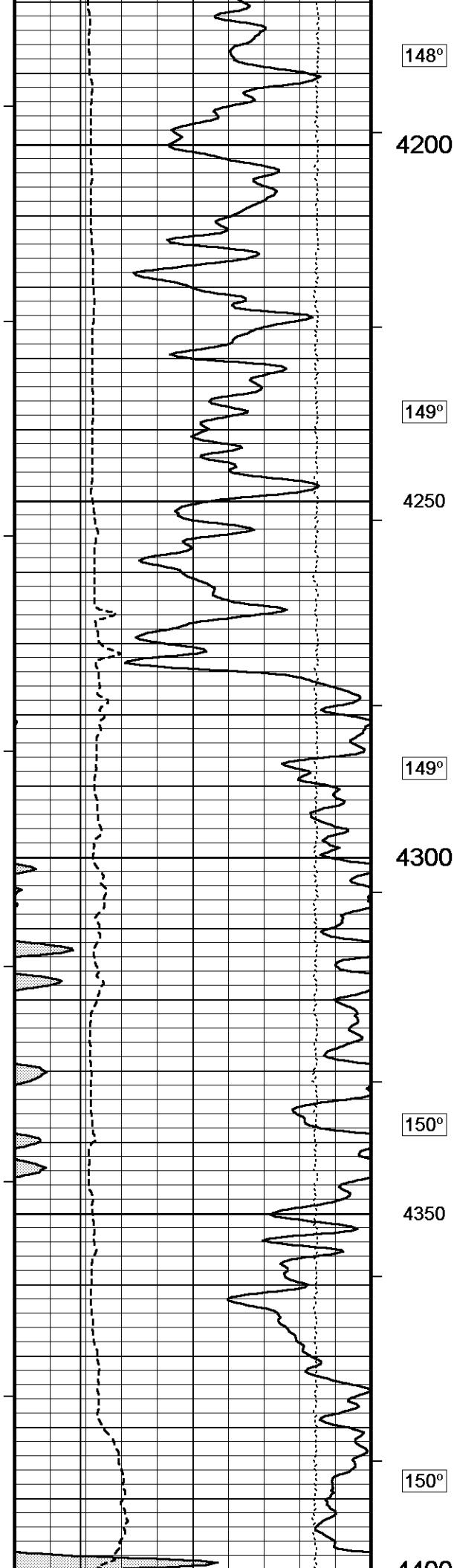
3950

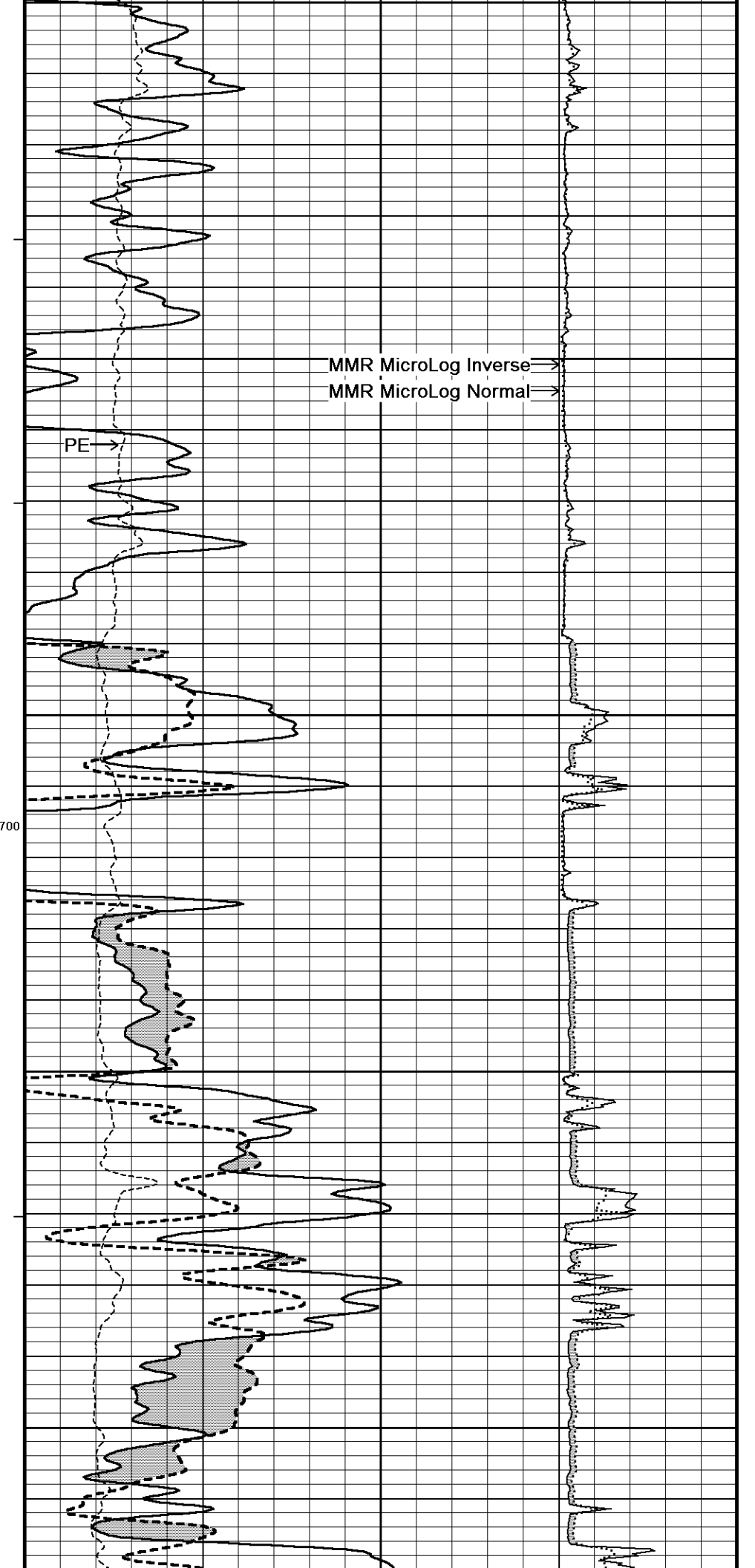
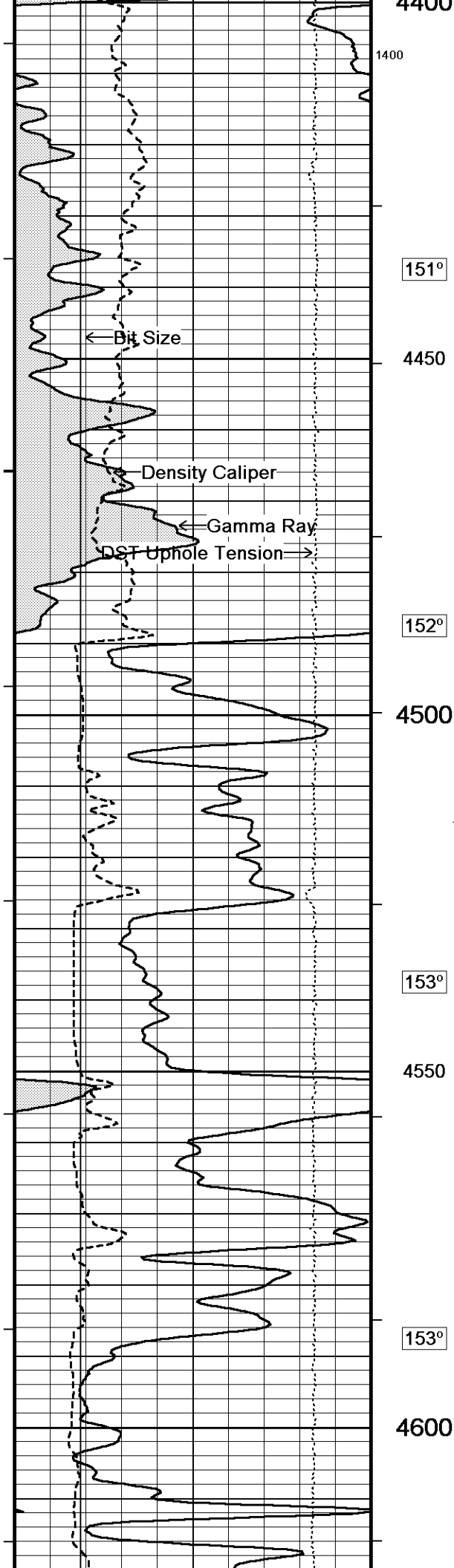


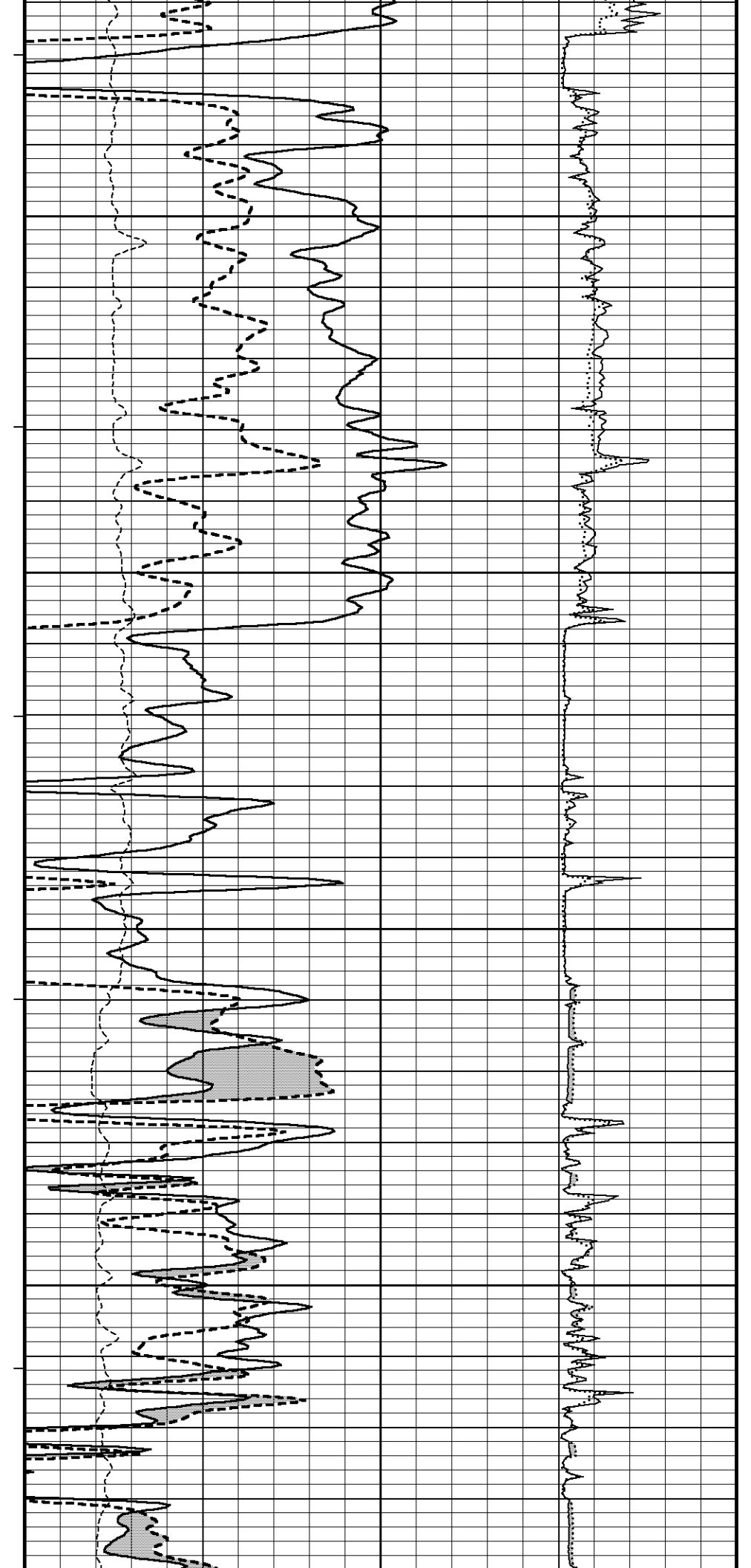
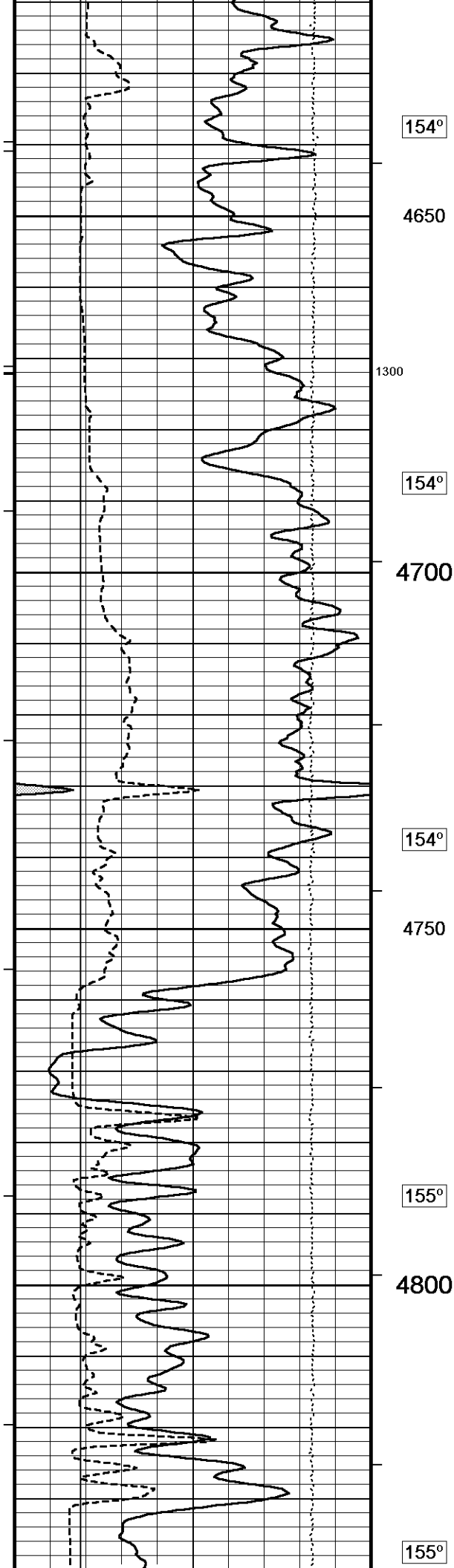


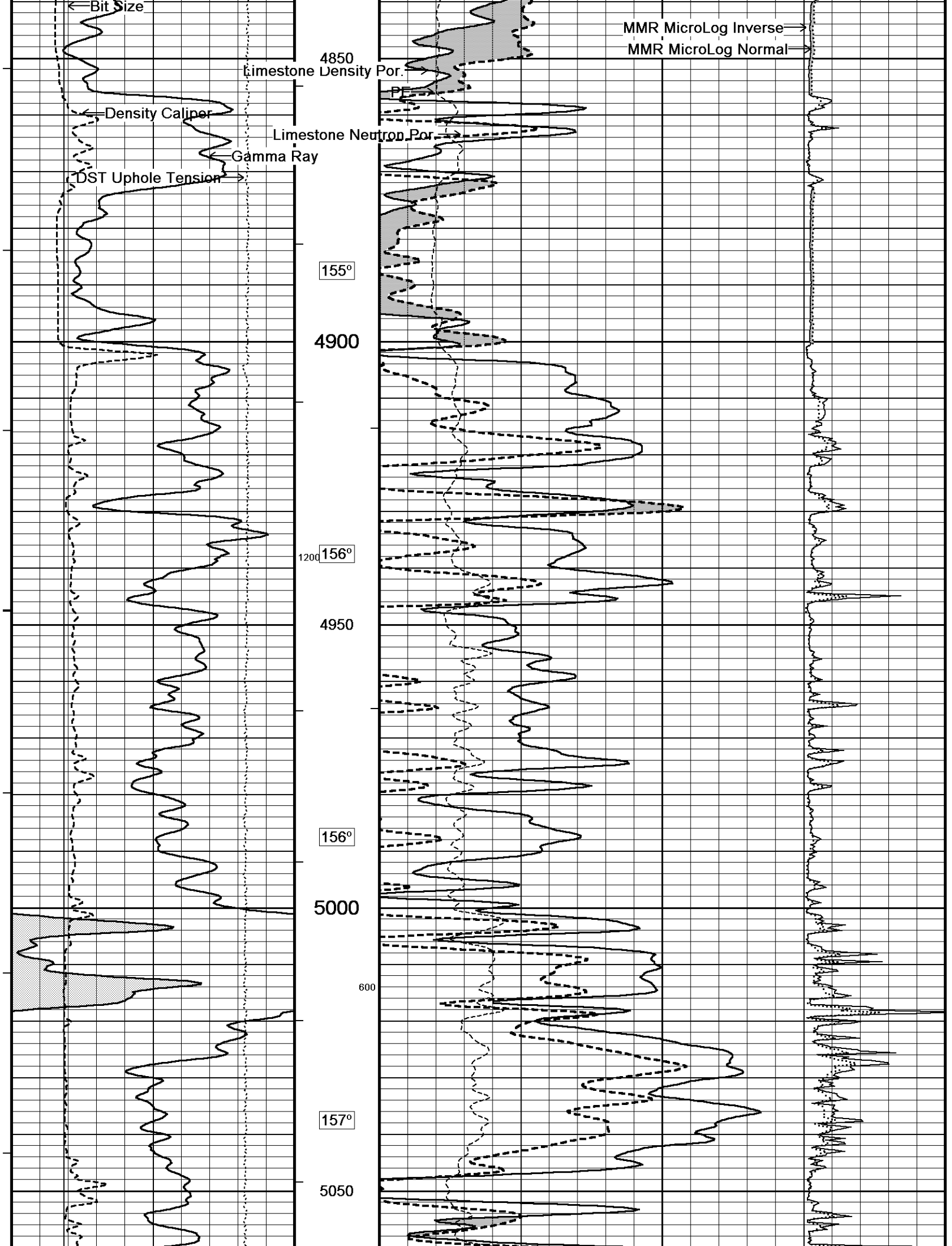
146°
4000
146°
4050
147°
4100
147°
1500
4150

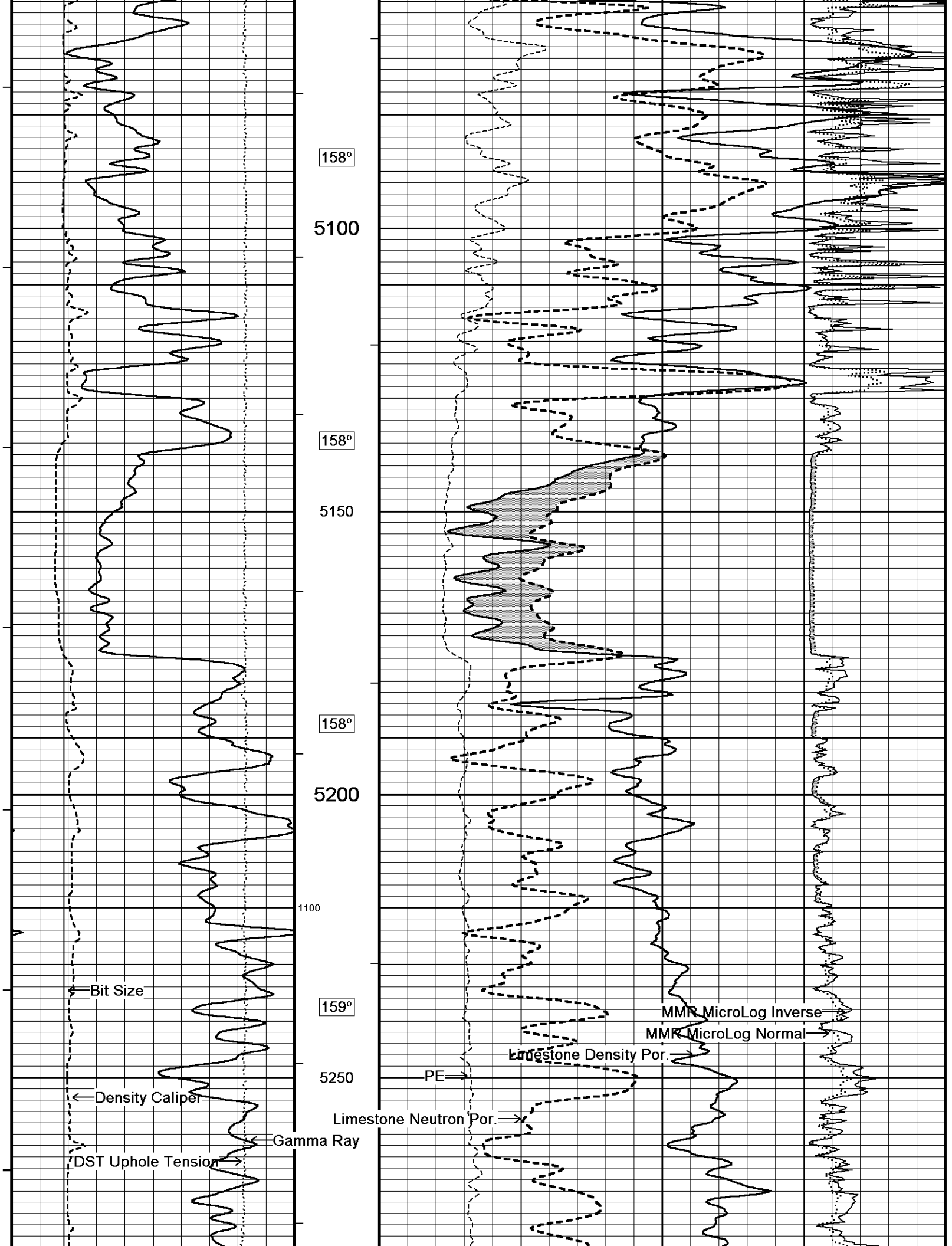


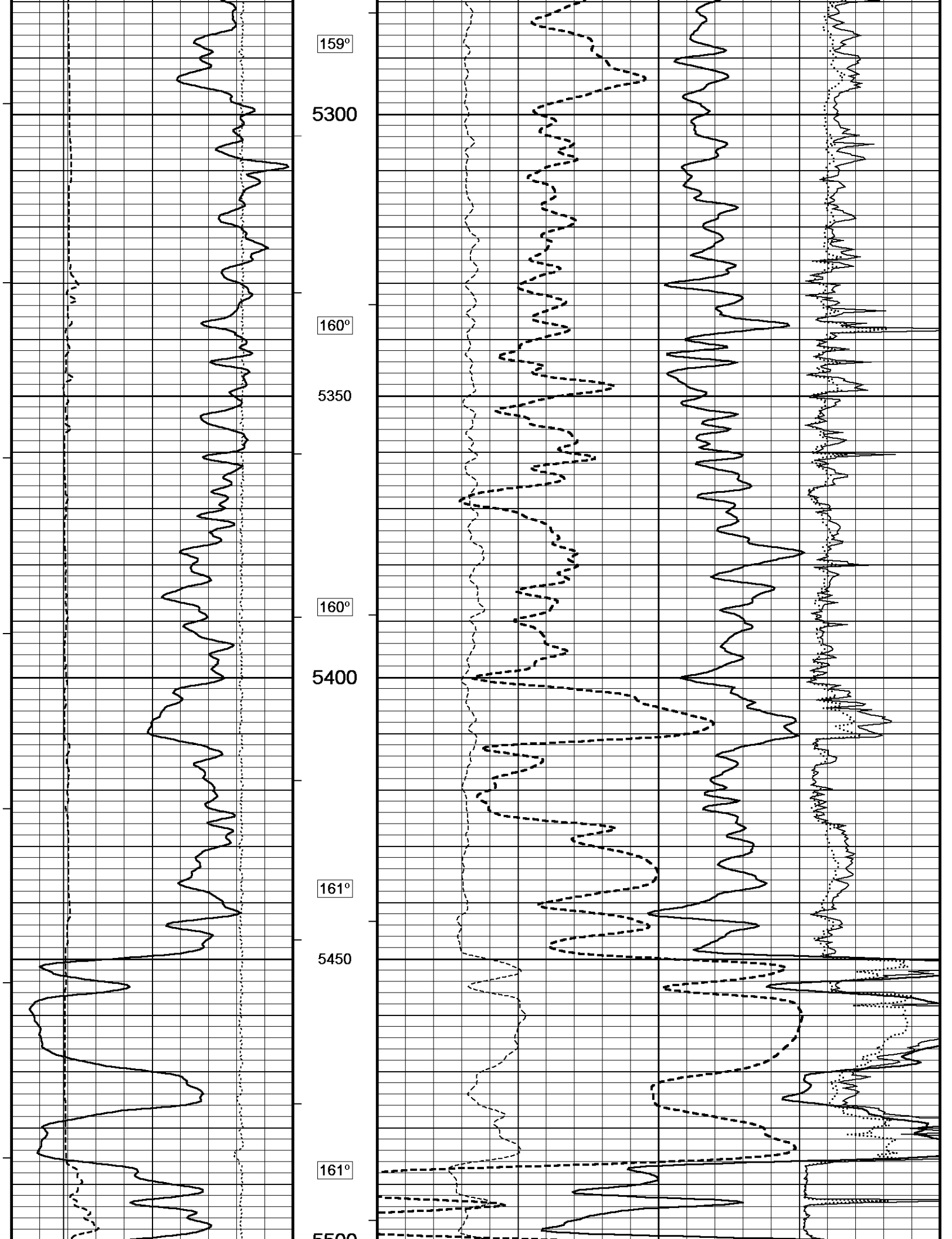


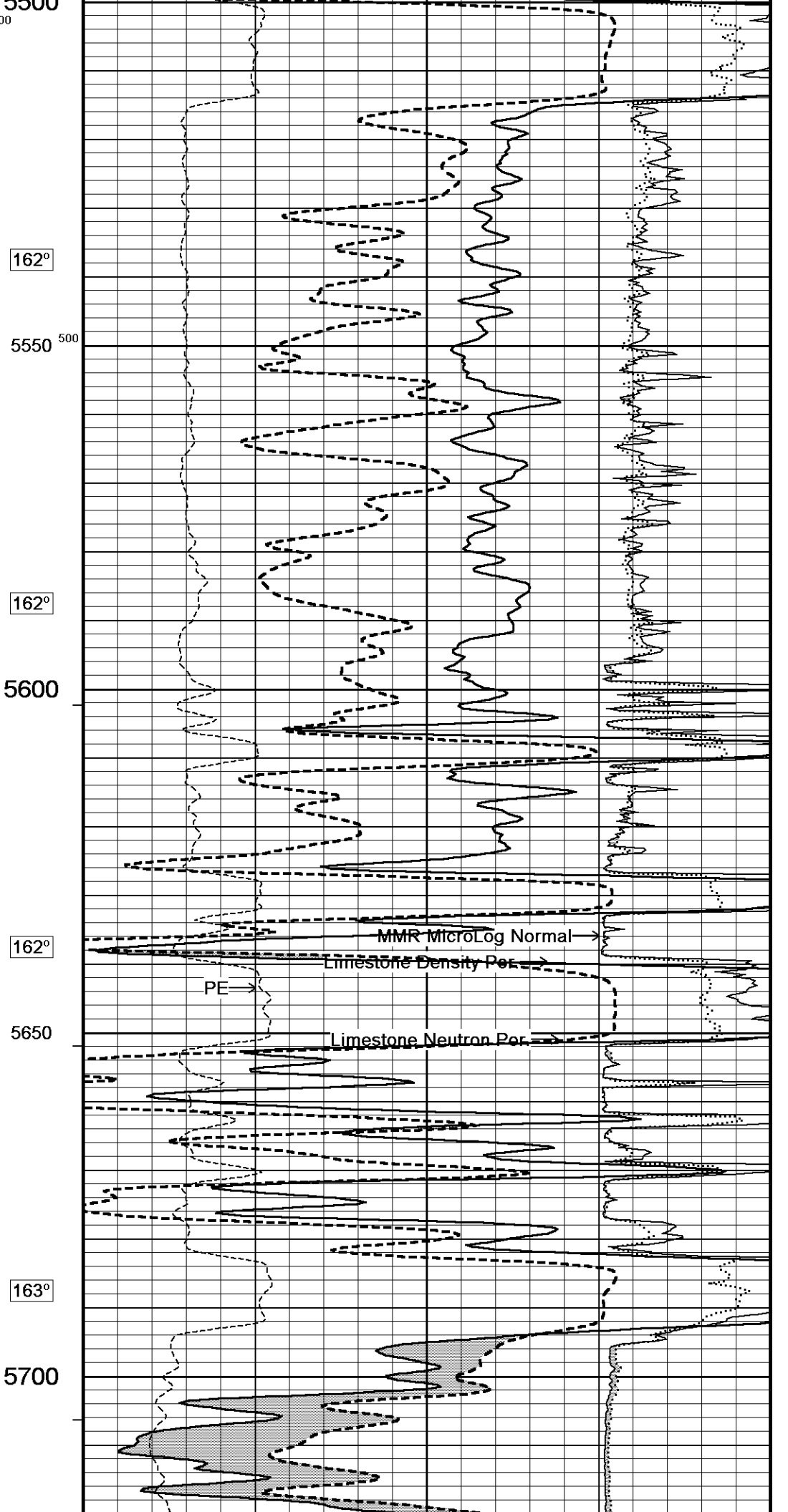
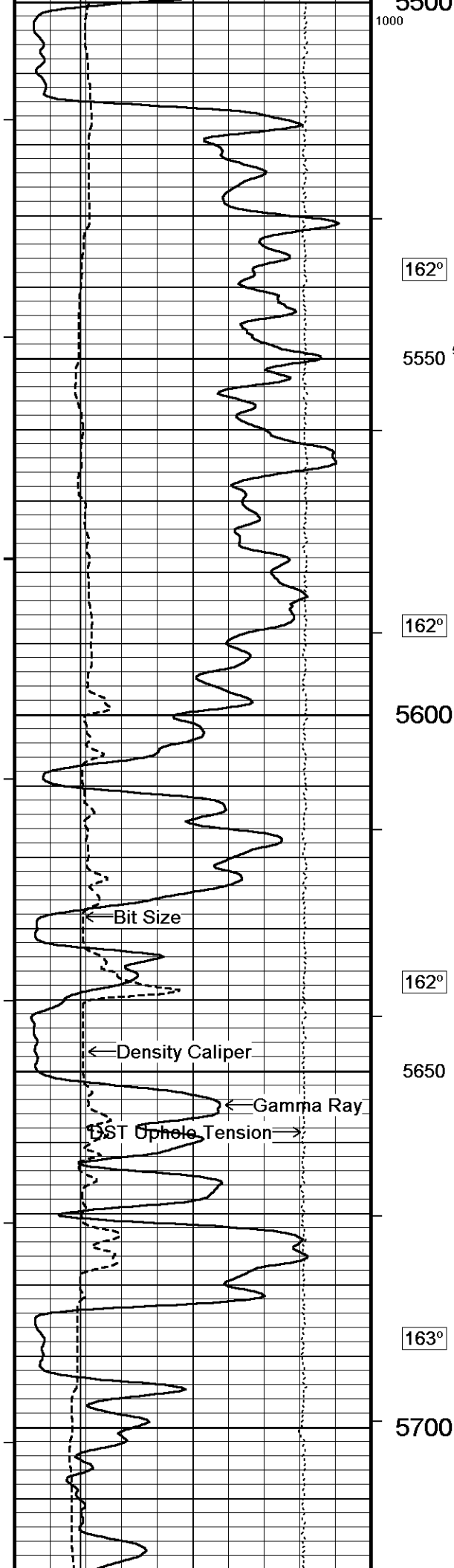


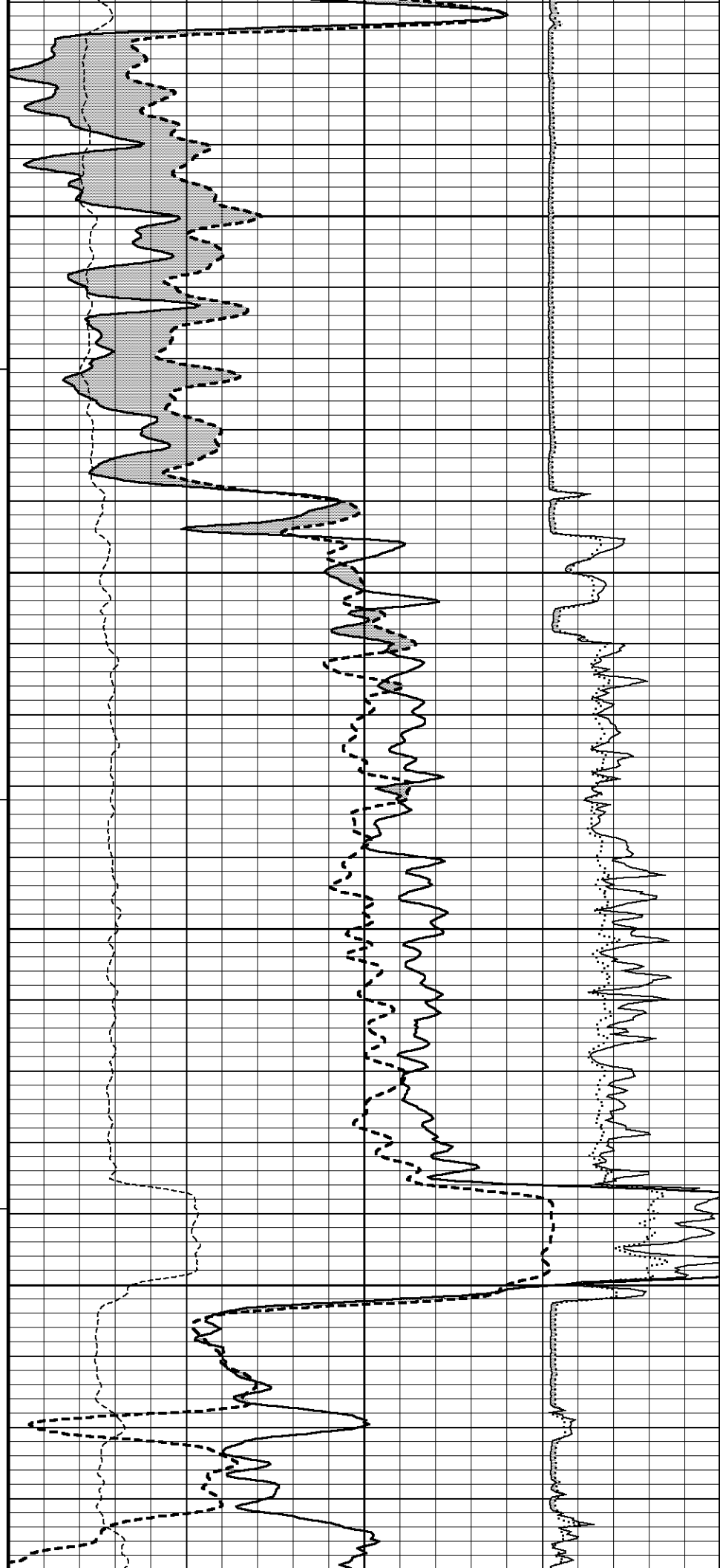
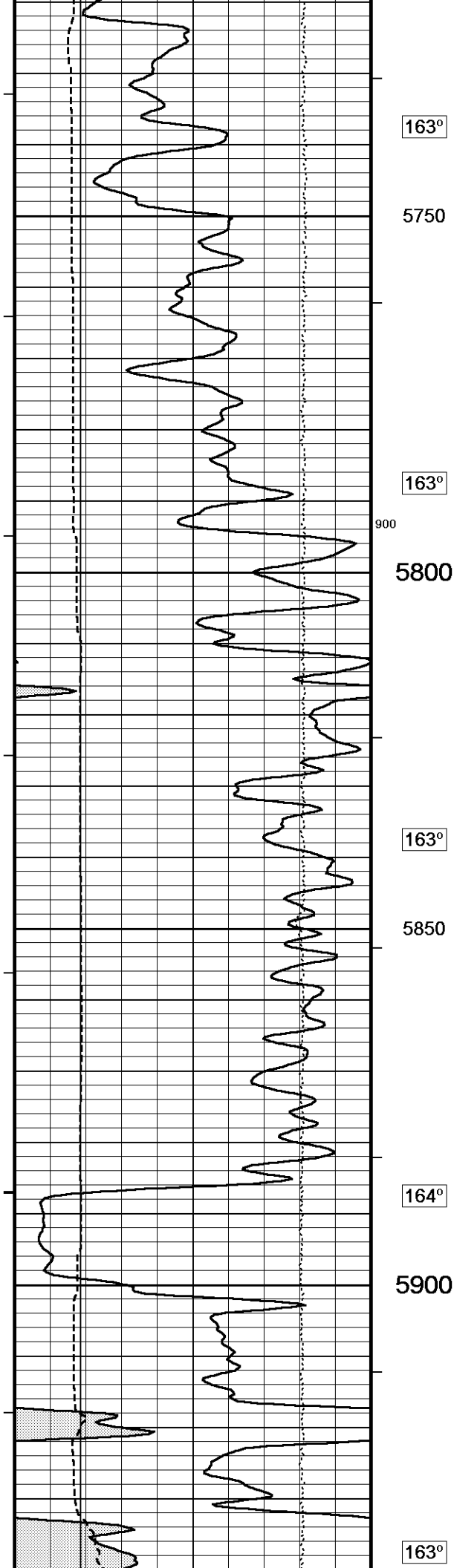


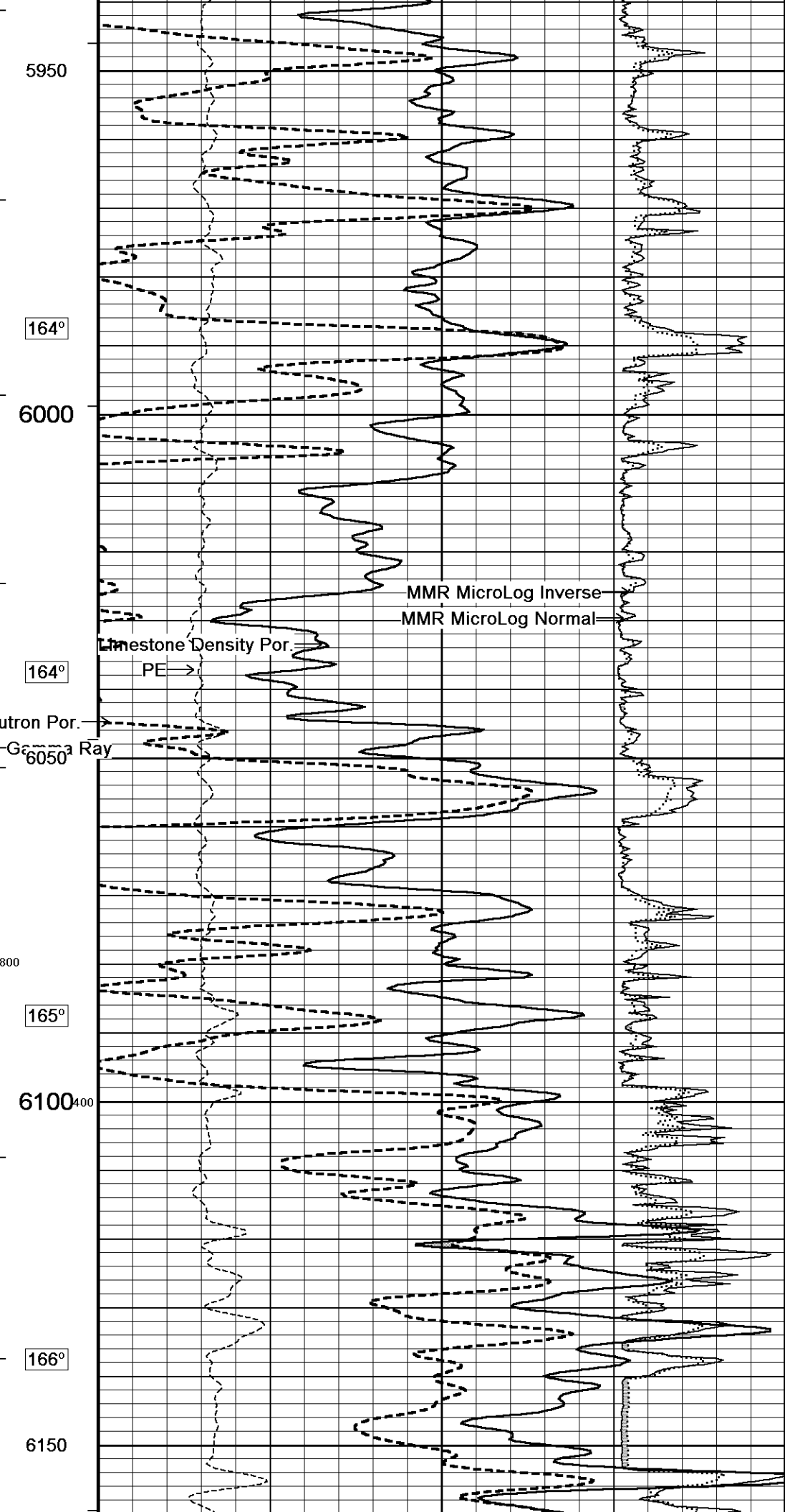
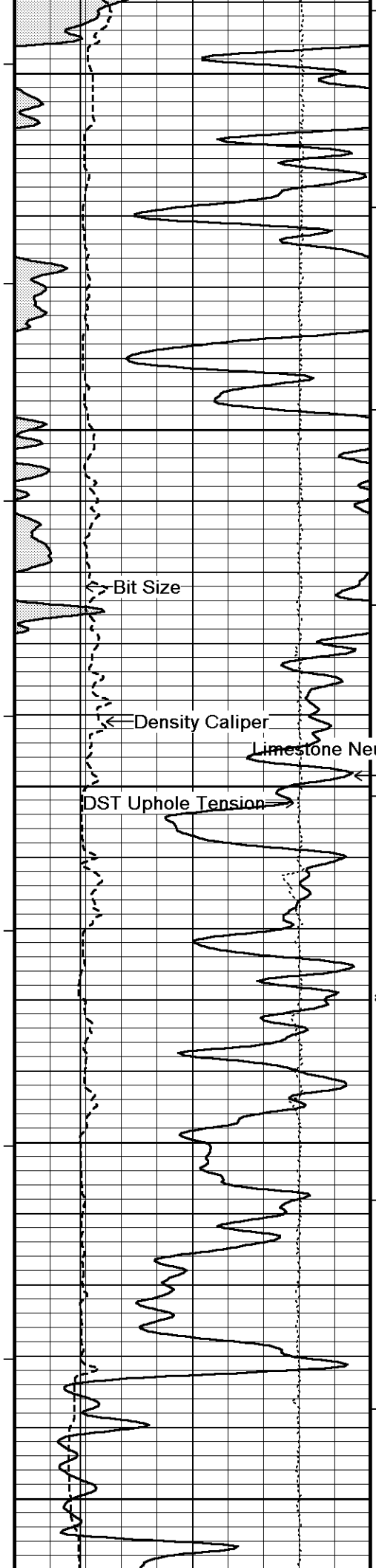


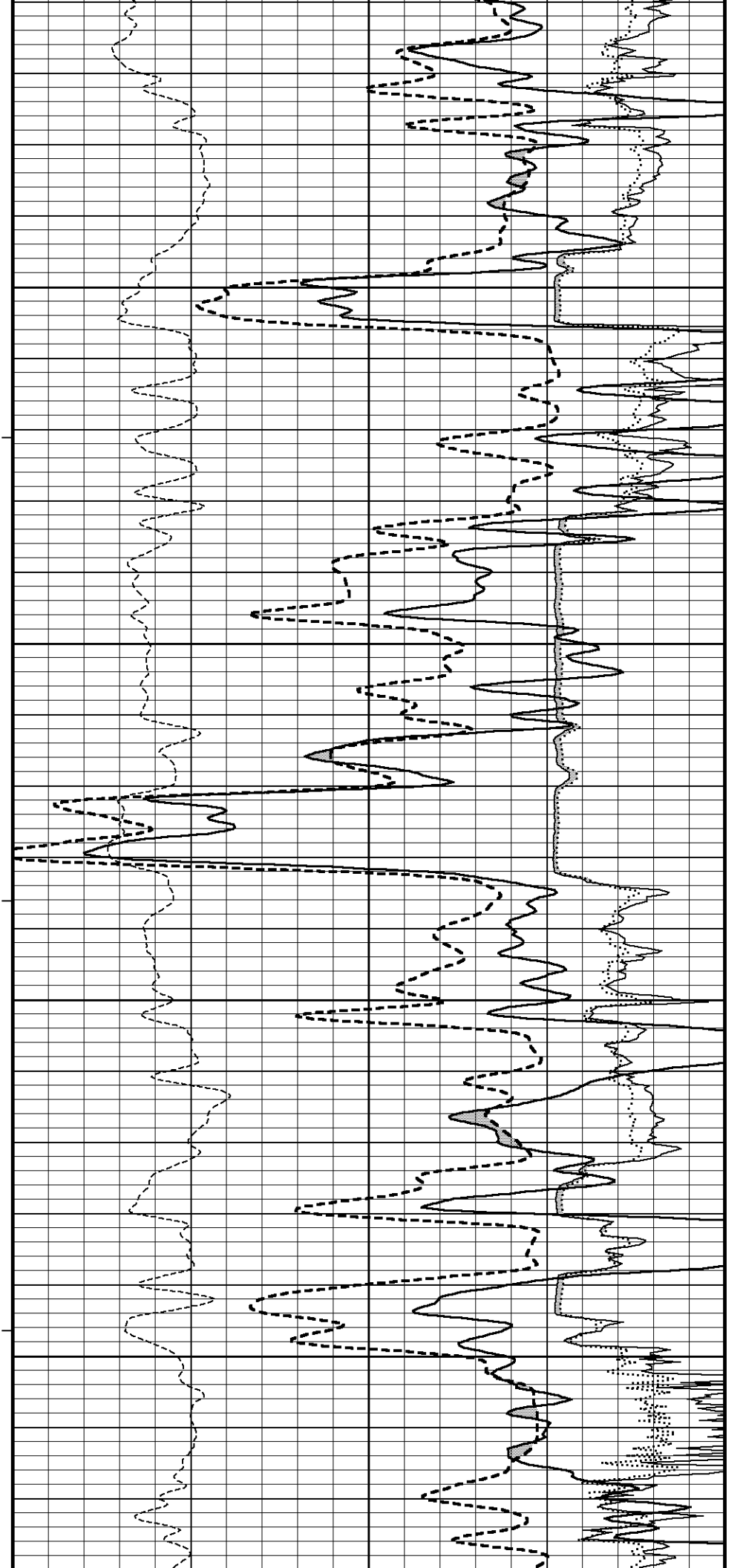
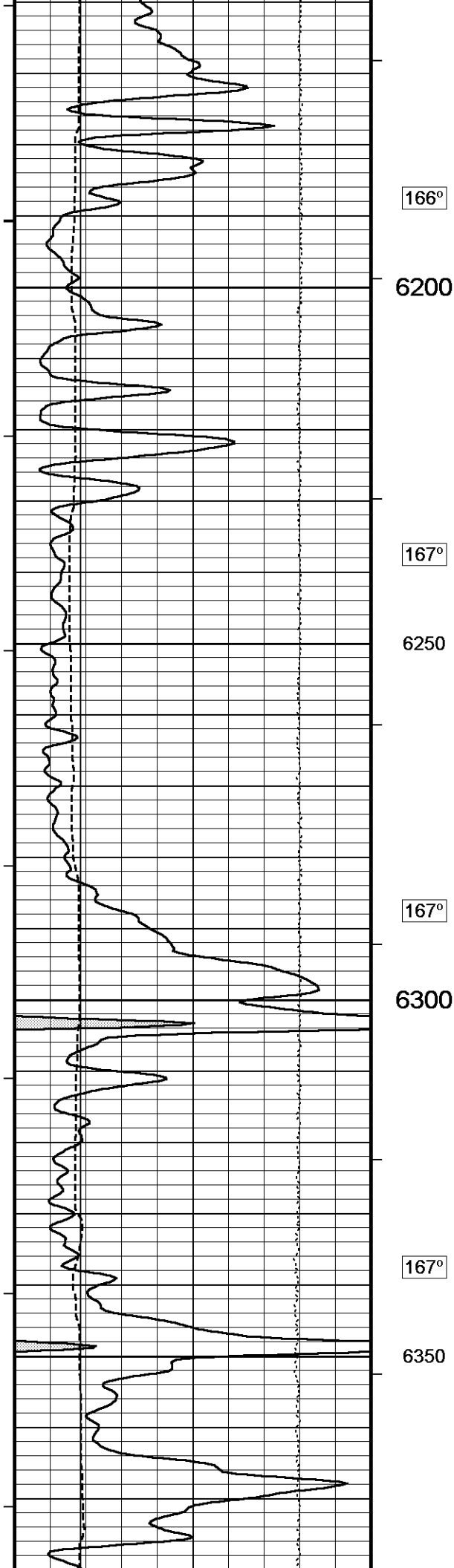


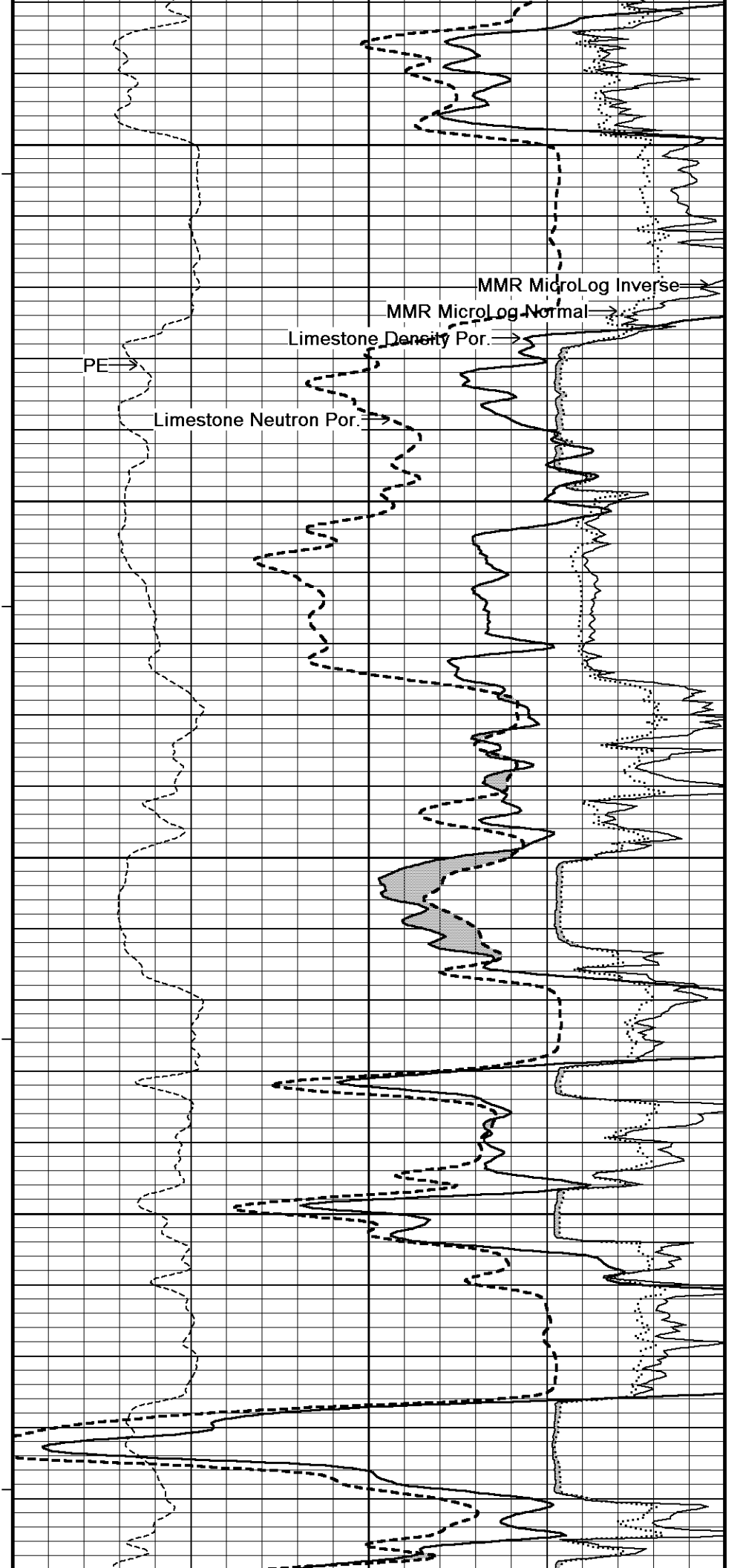
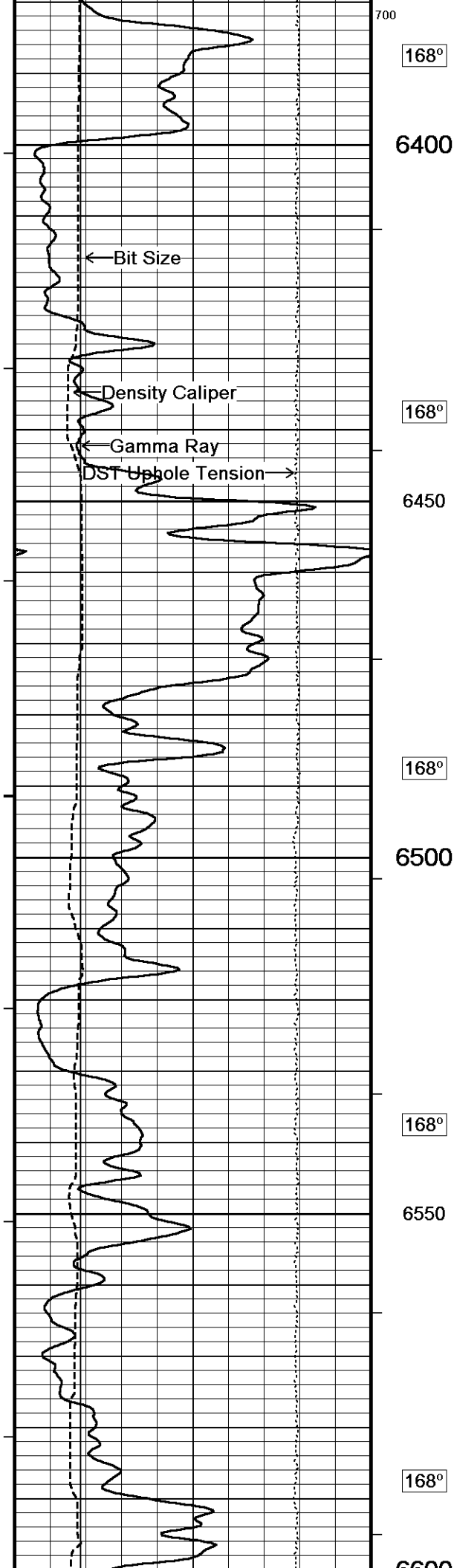


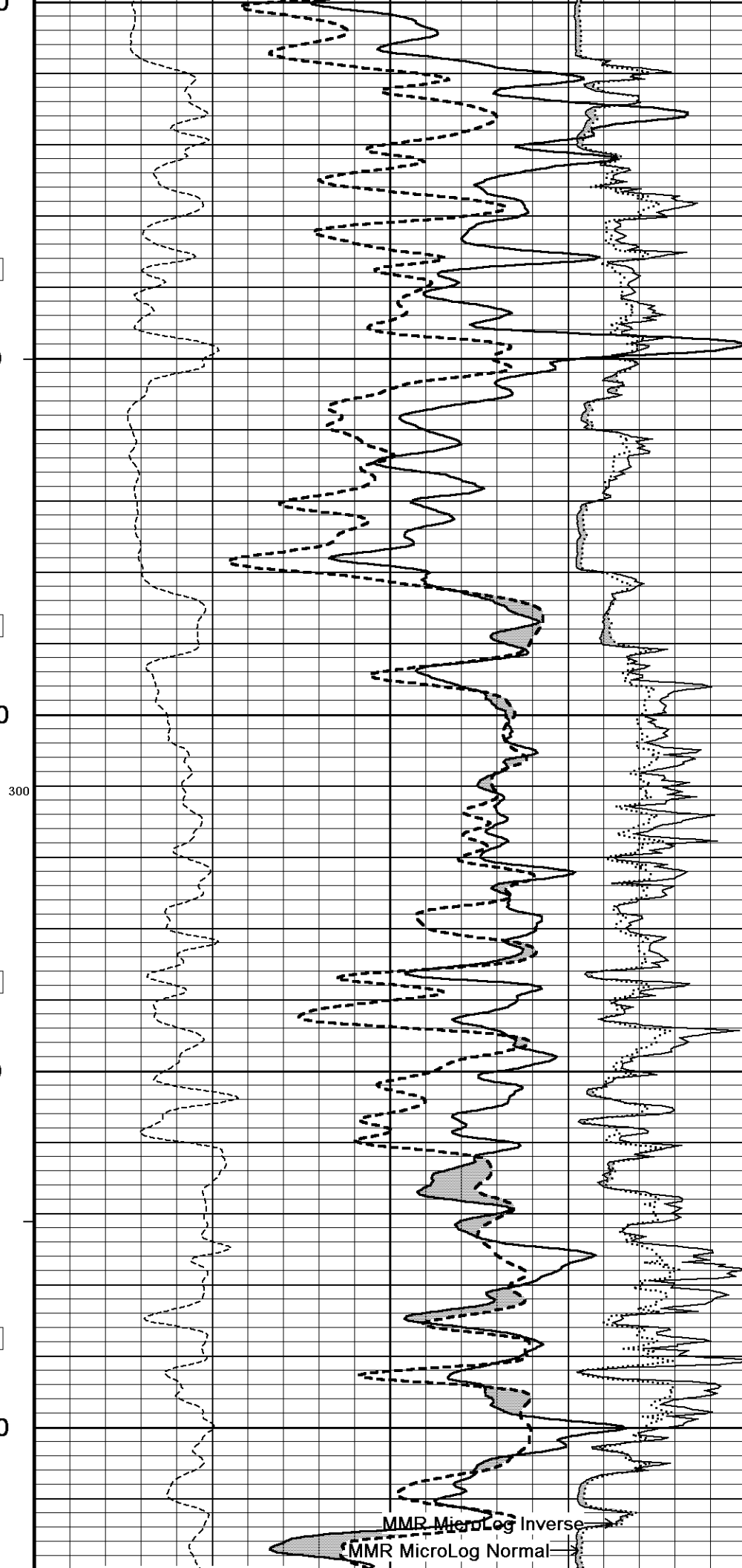
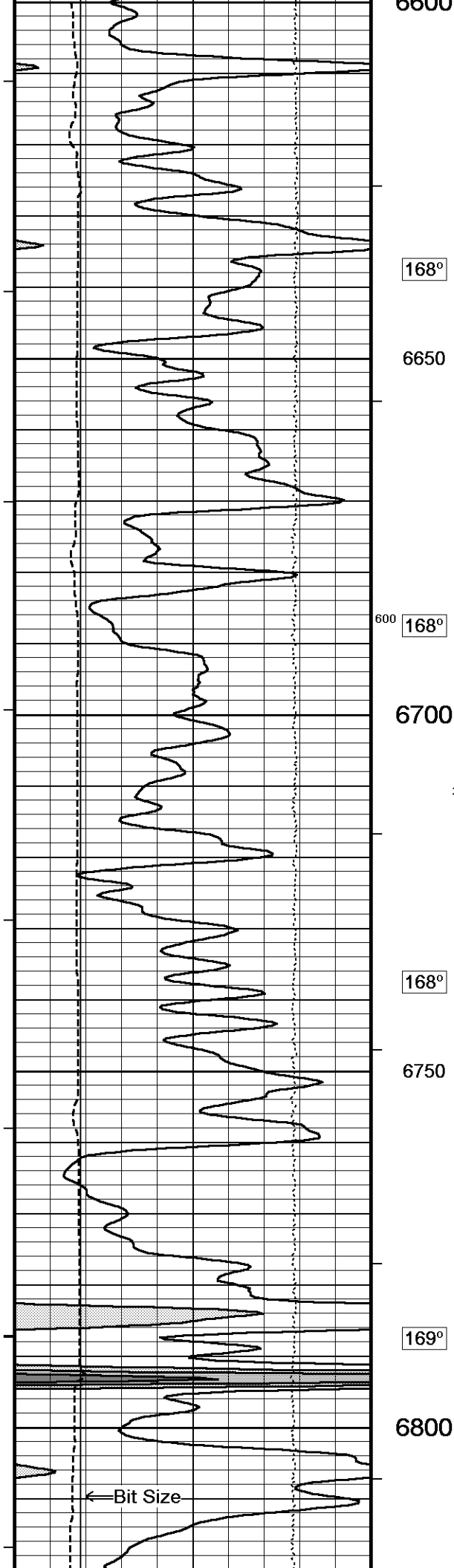


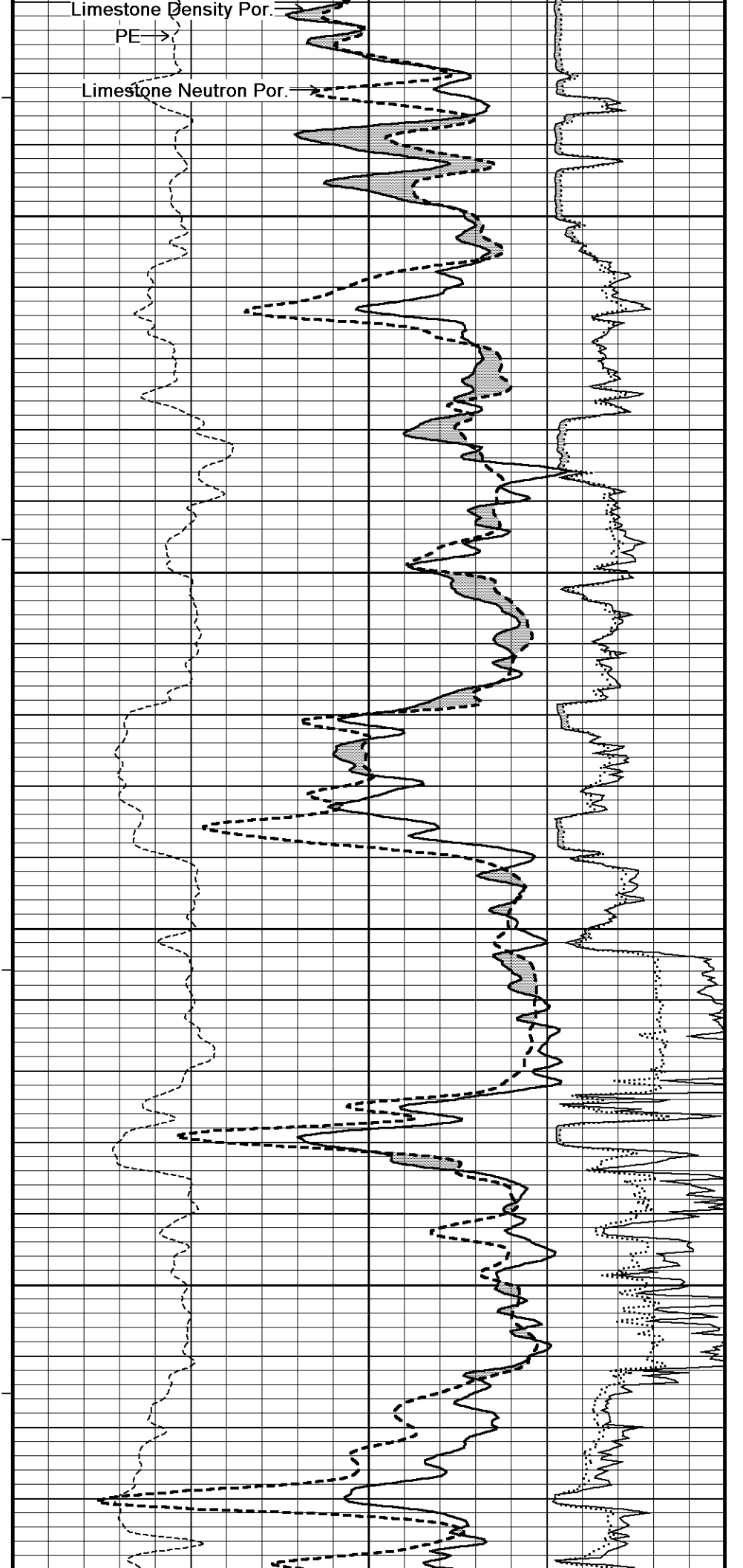
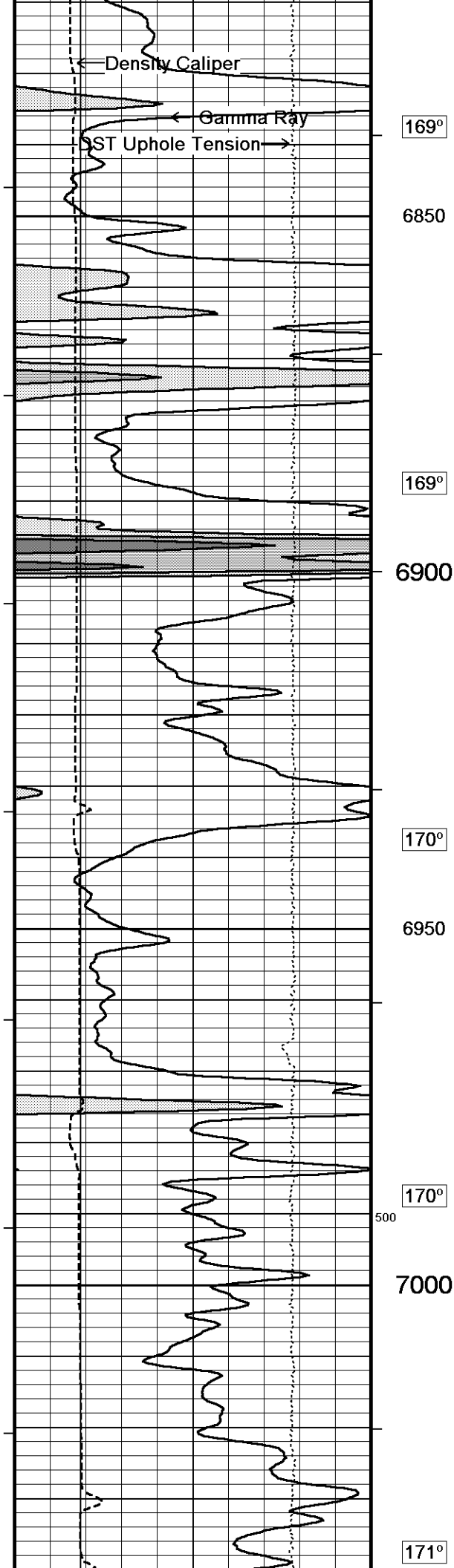


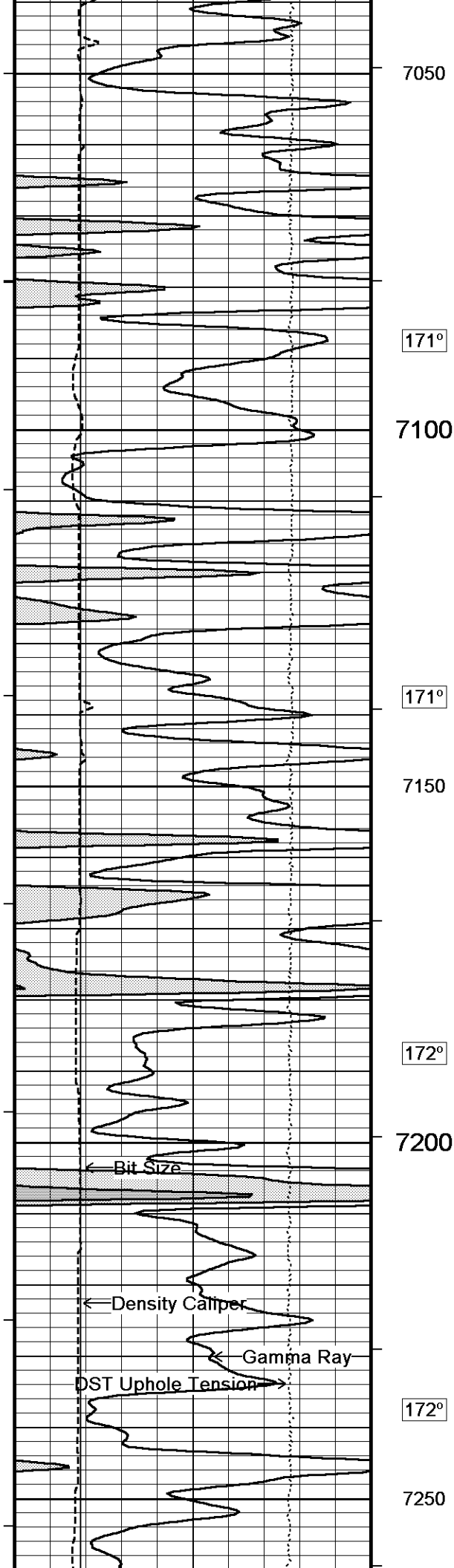












7050

171°

7100

171°

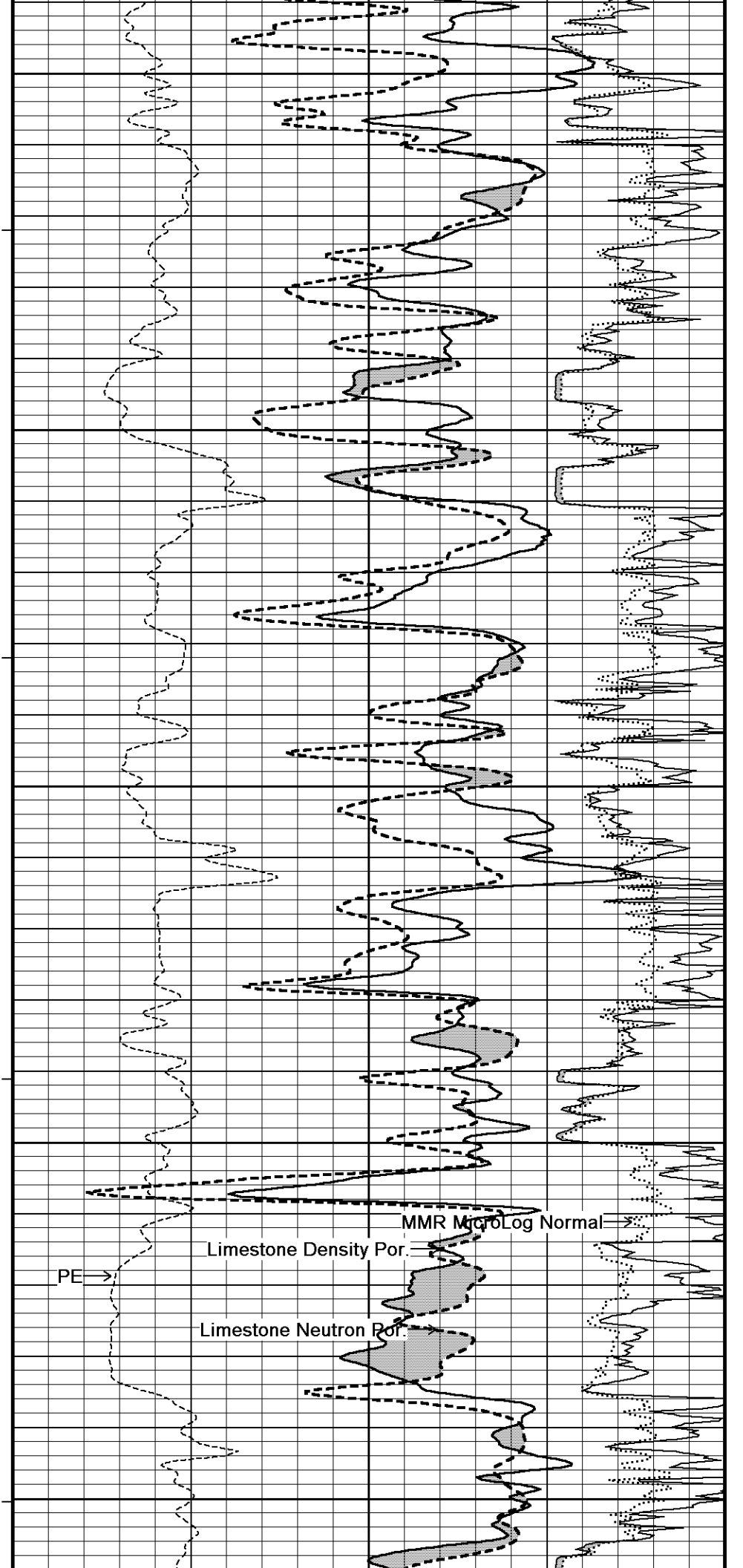
7150

172°

7200

172°

7250

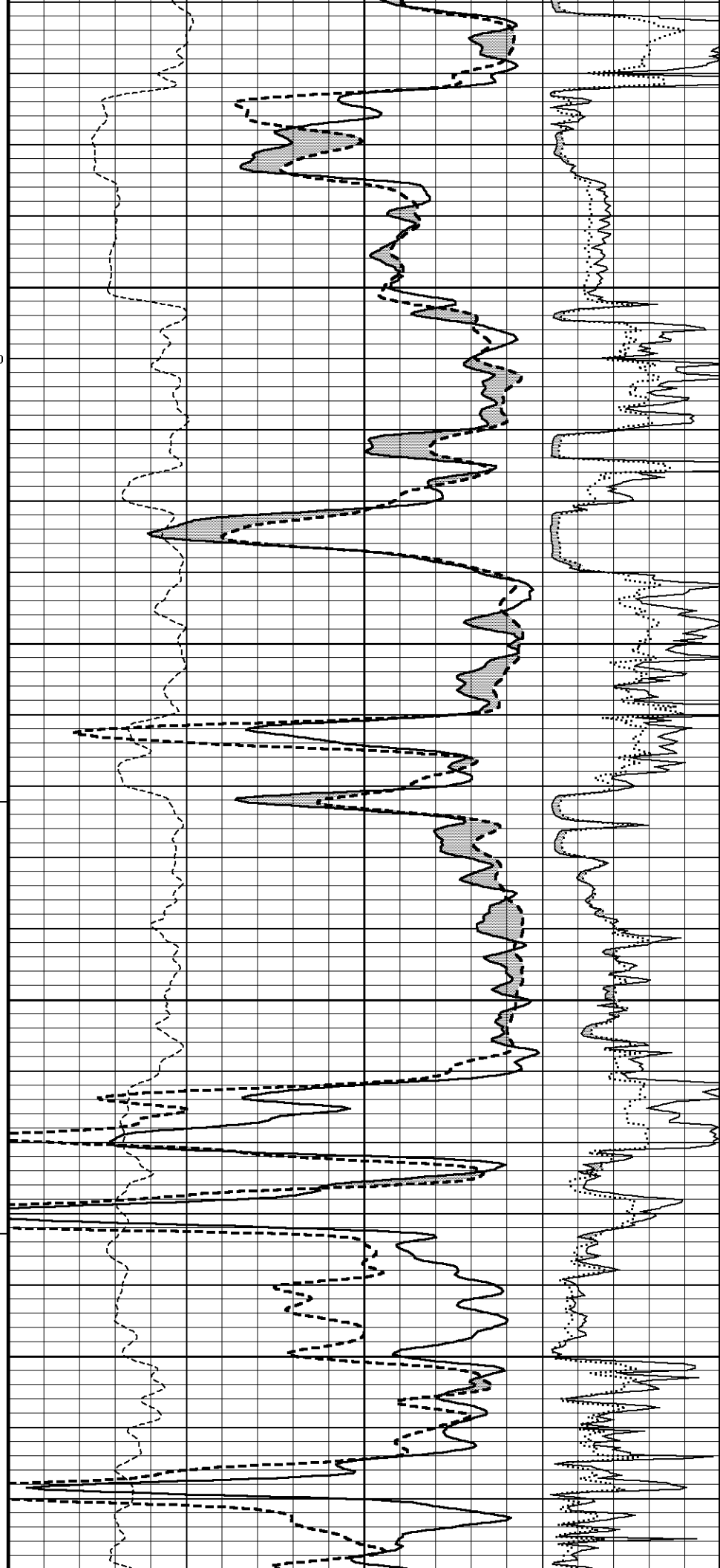
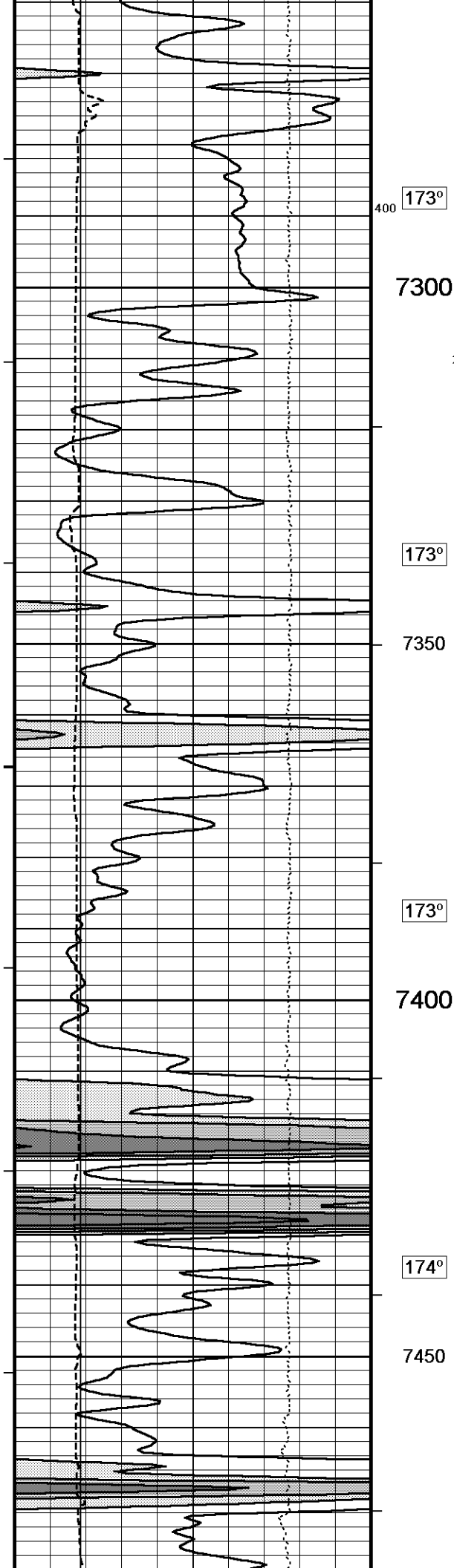


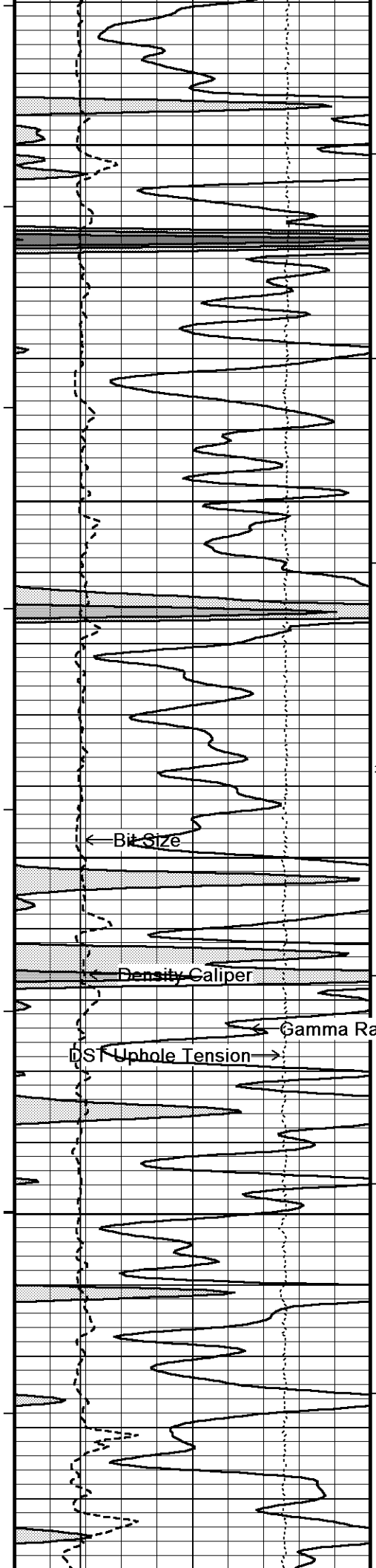
PE →

MMR MicroLog Normal →

Limestone Density Por. →

Limestone Neutron Por. →





175°
7500
175°
7550
300 175°
7600
175°
7650
175°
7700

Bit Size

Density Caliper

Gamma Ray

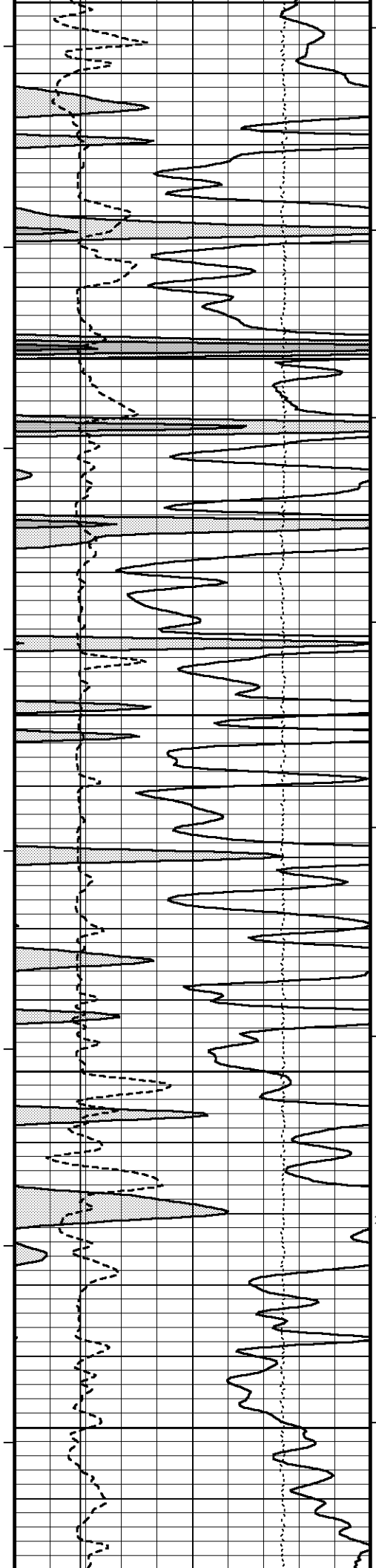
DST Uphole Tension

Limestone Density Por

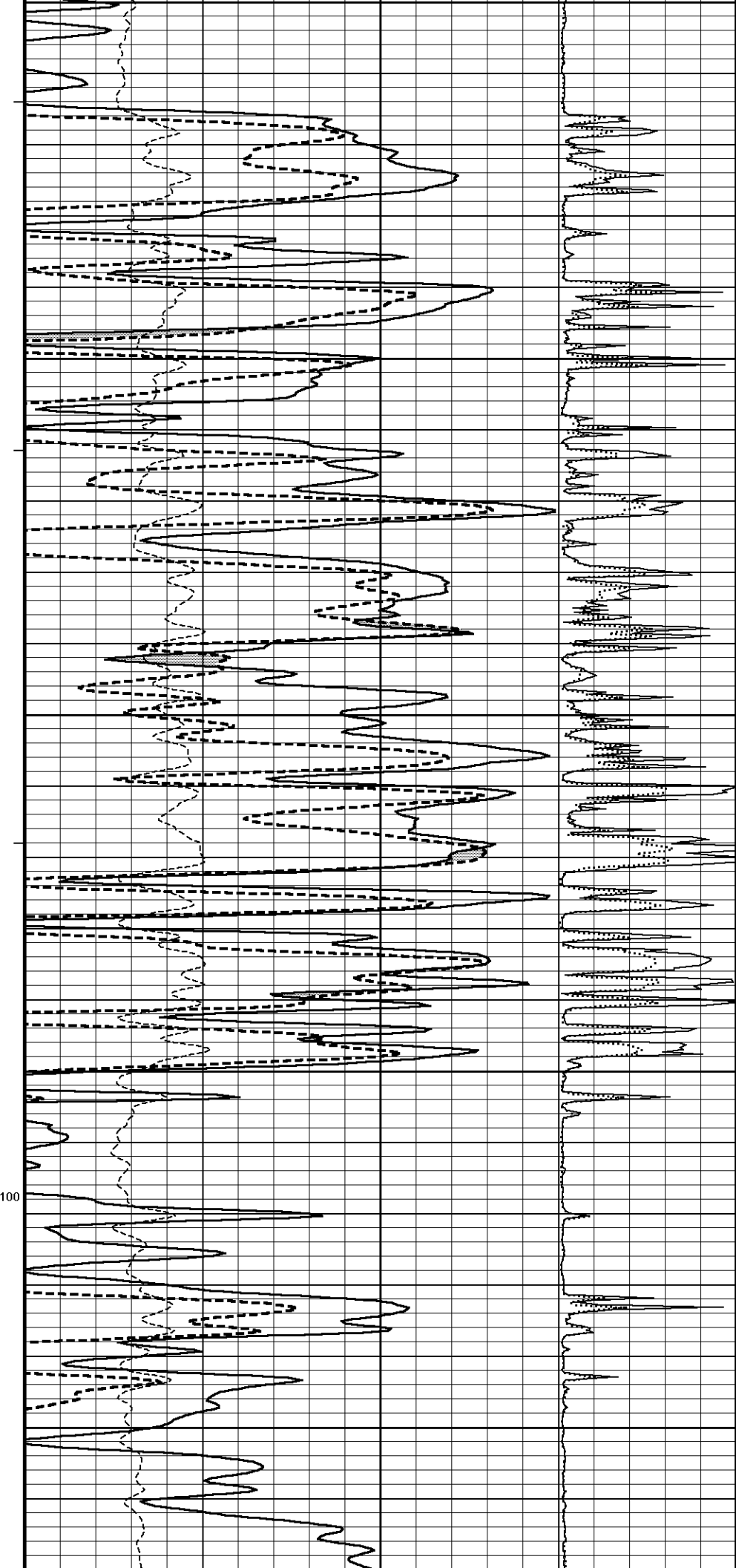
PE

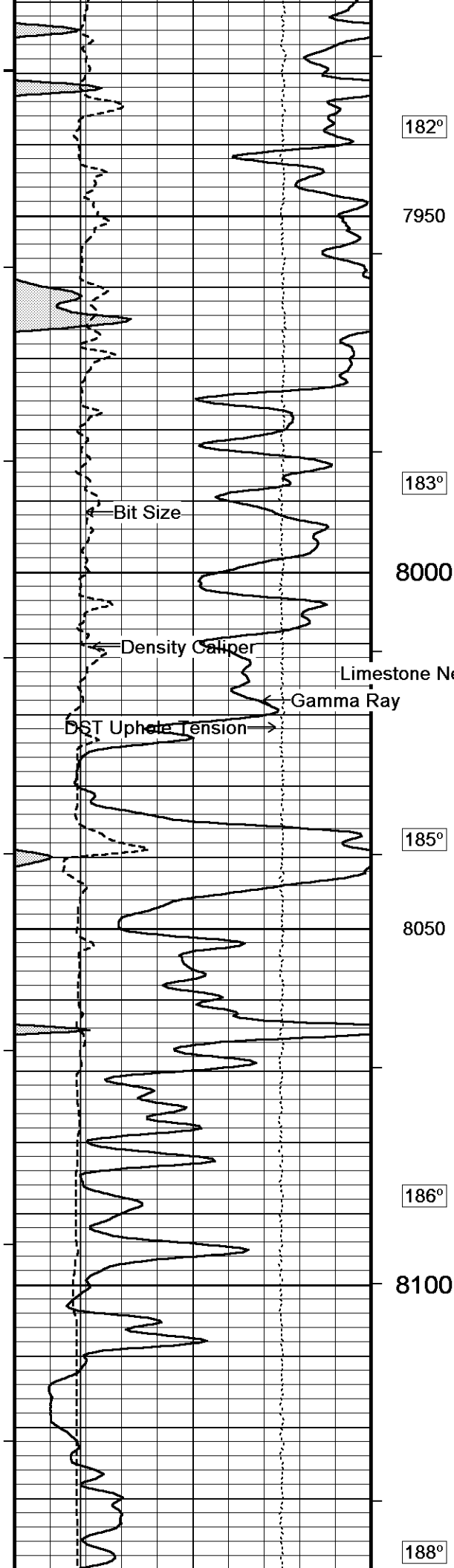
MMR MicroLog Inverse

MMR MicroLog Normal



7700
176°
7750
177°
7800
178°
7850
200
100
180°
7900





182°

7950

183°

8000

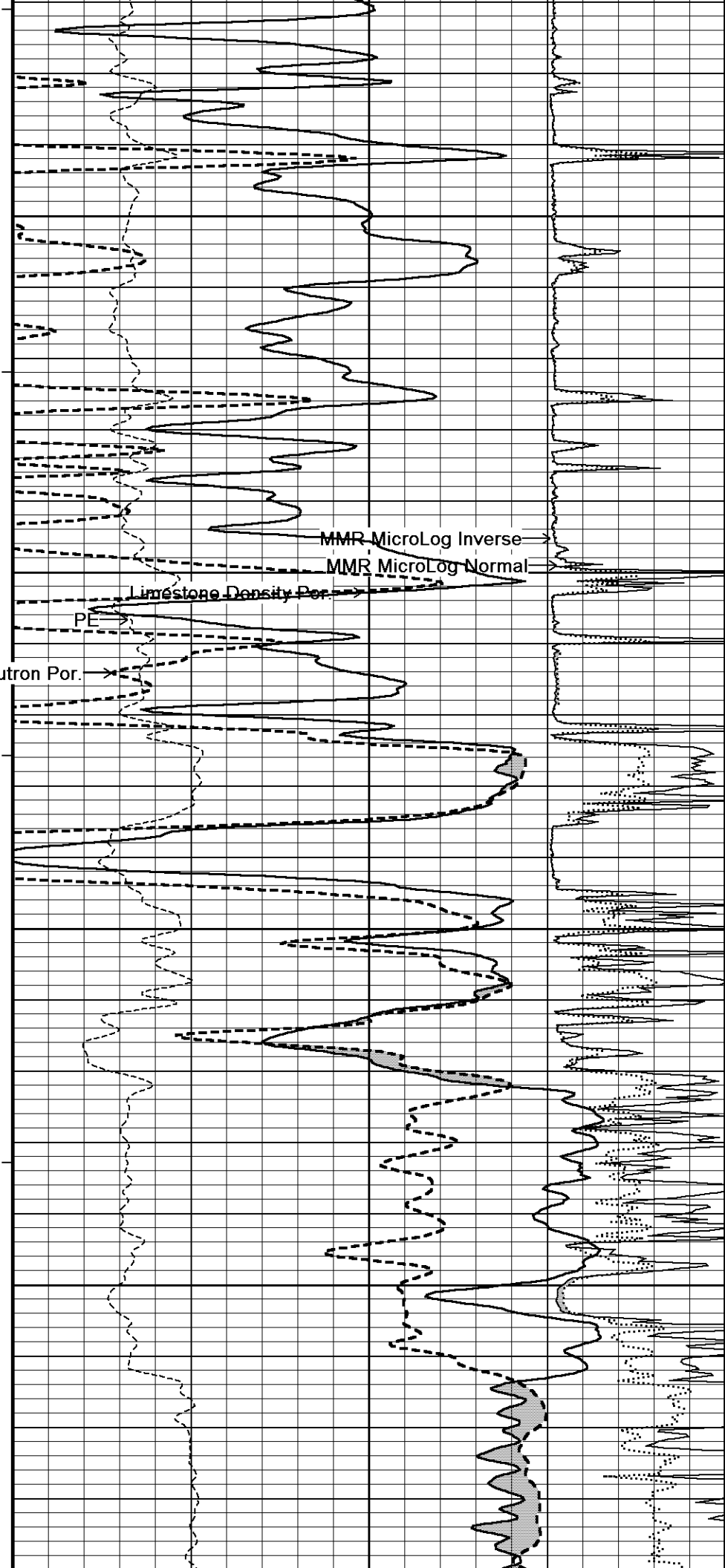
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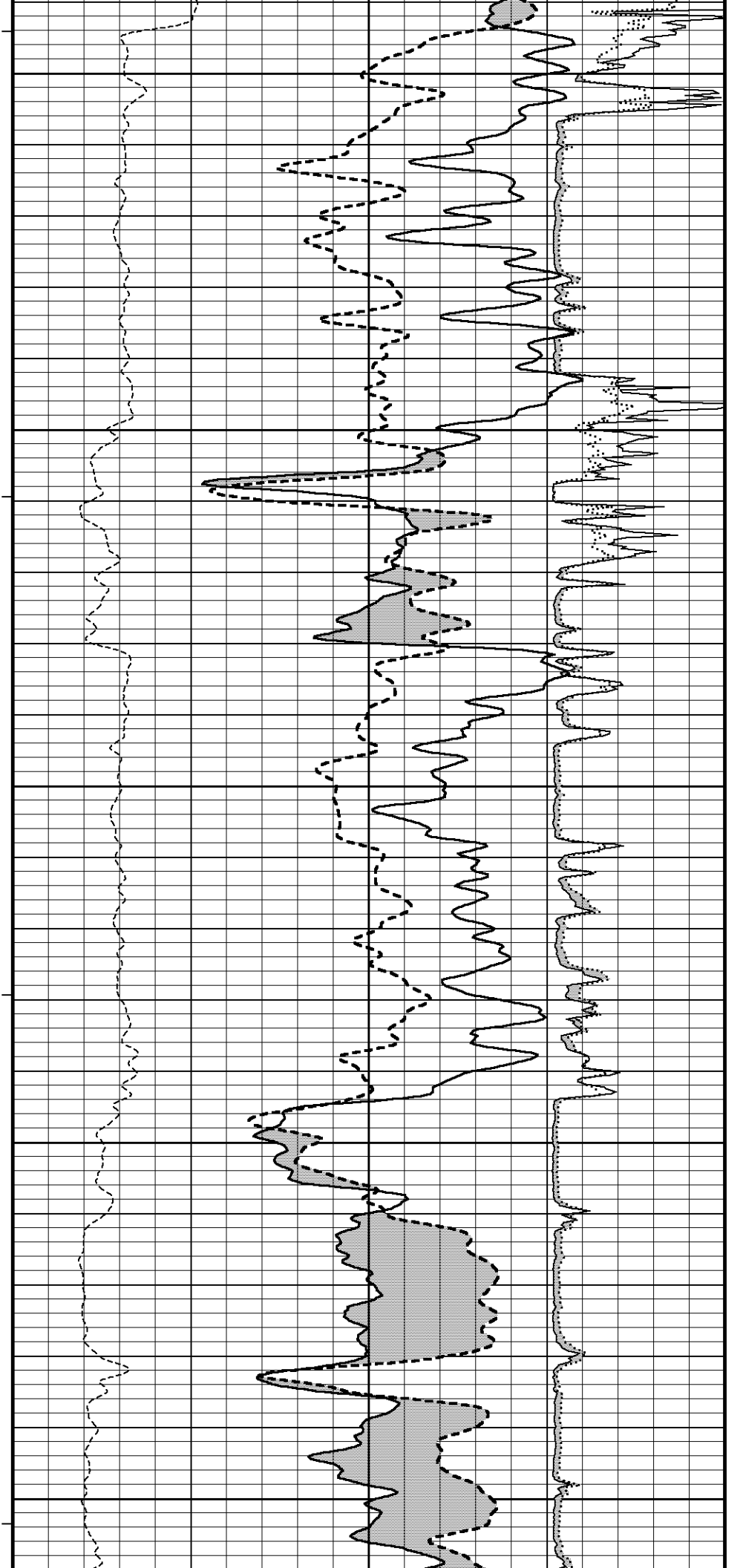
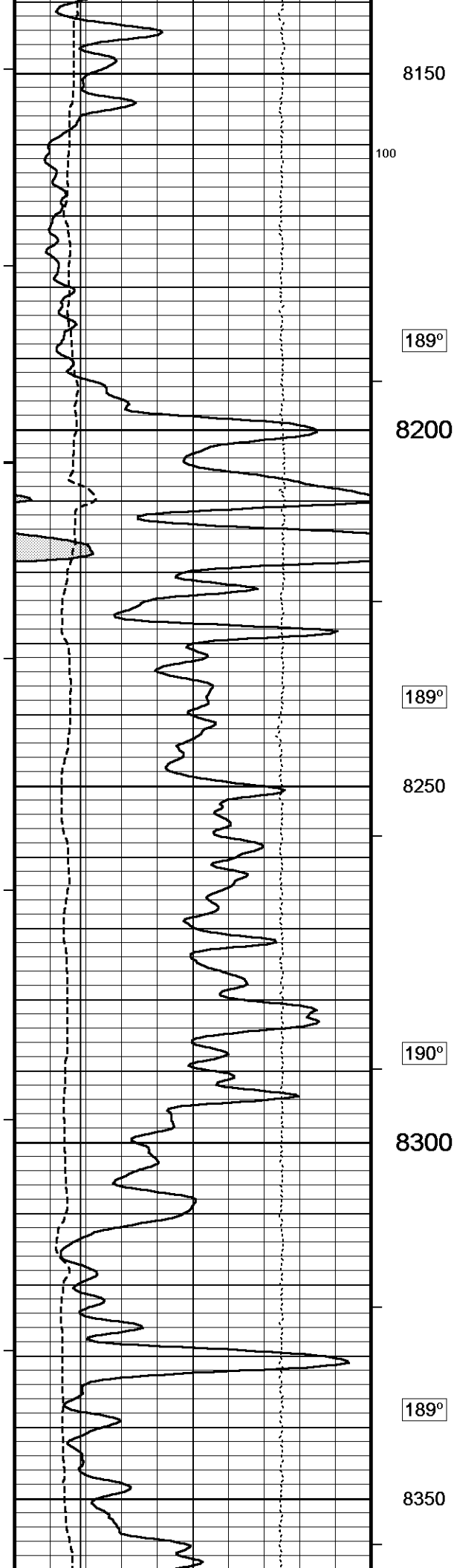
8050

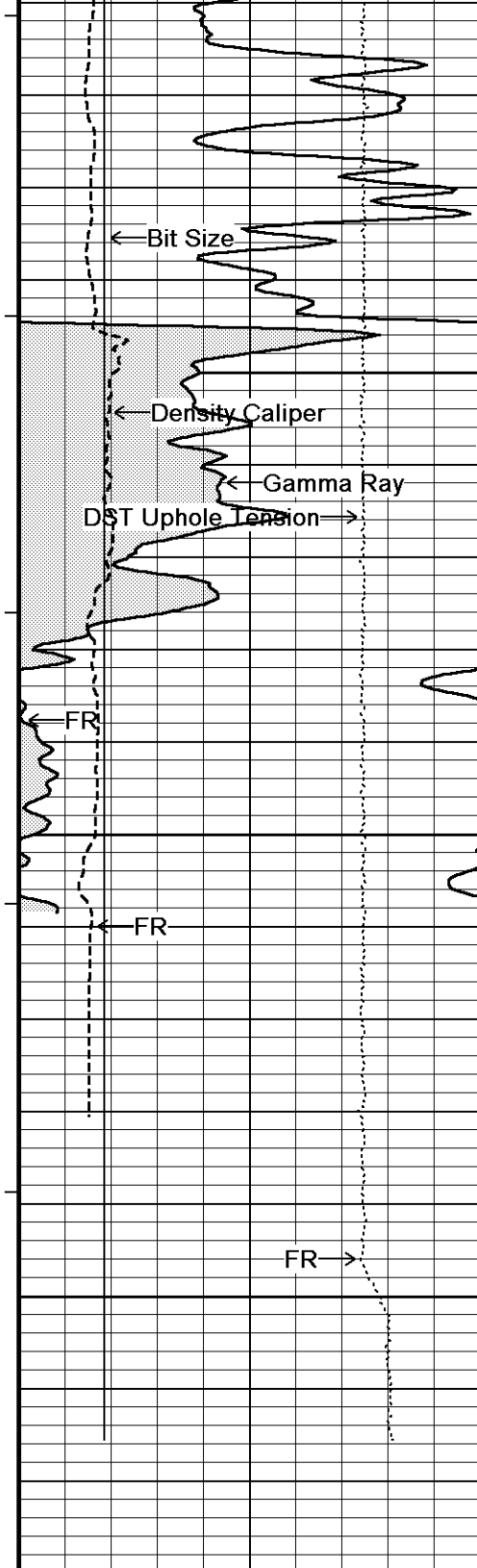
186°

8100

188°







189°

8400

189°

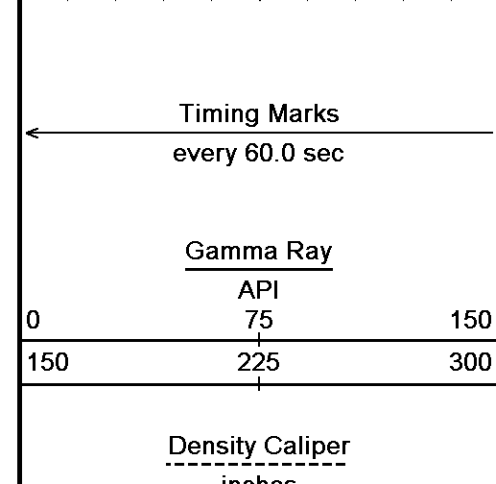
8450

0

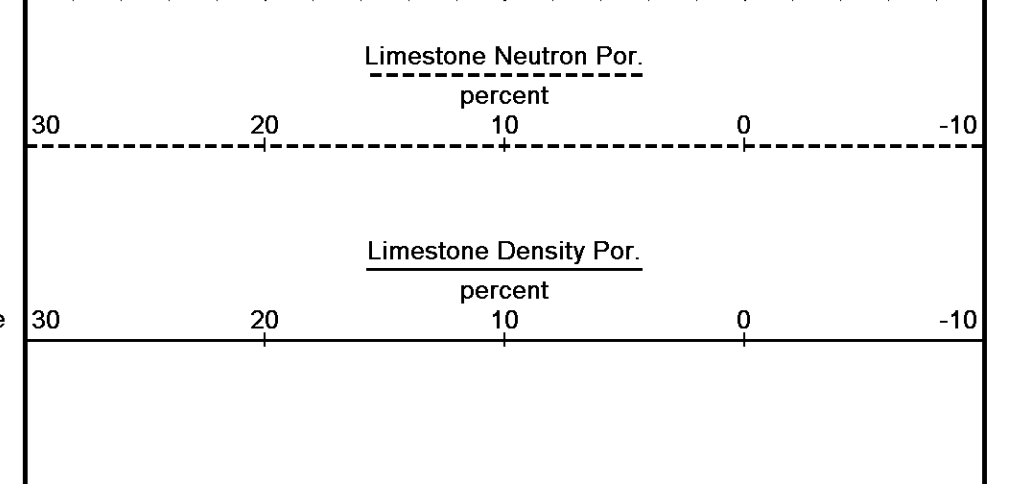
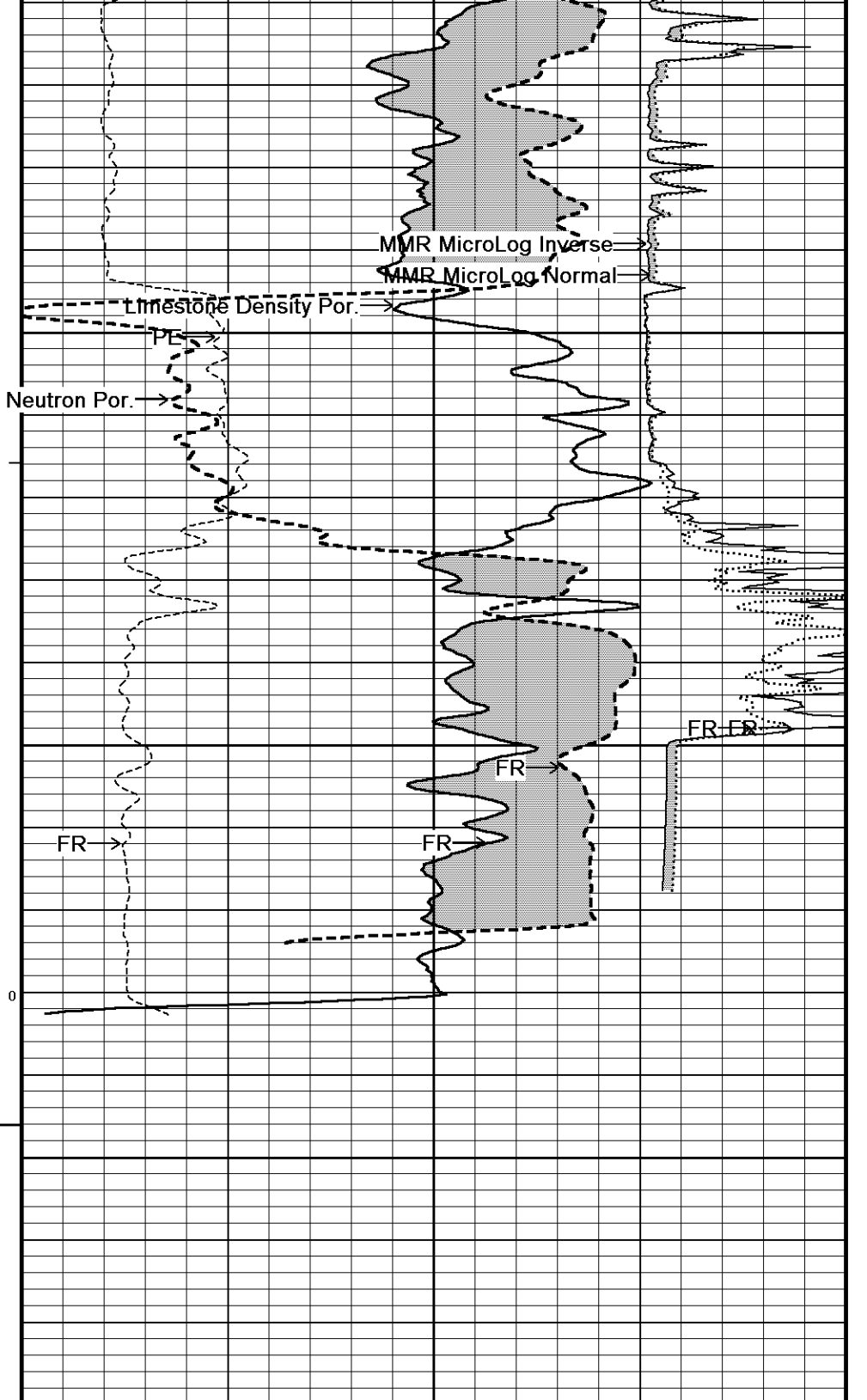
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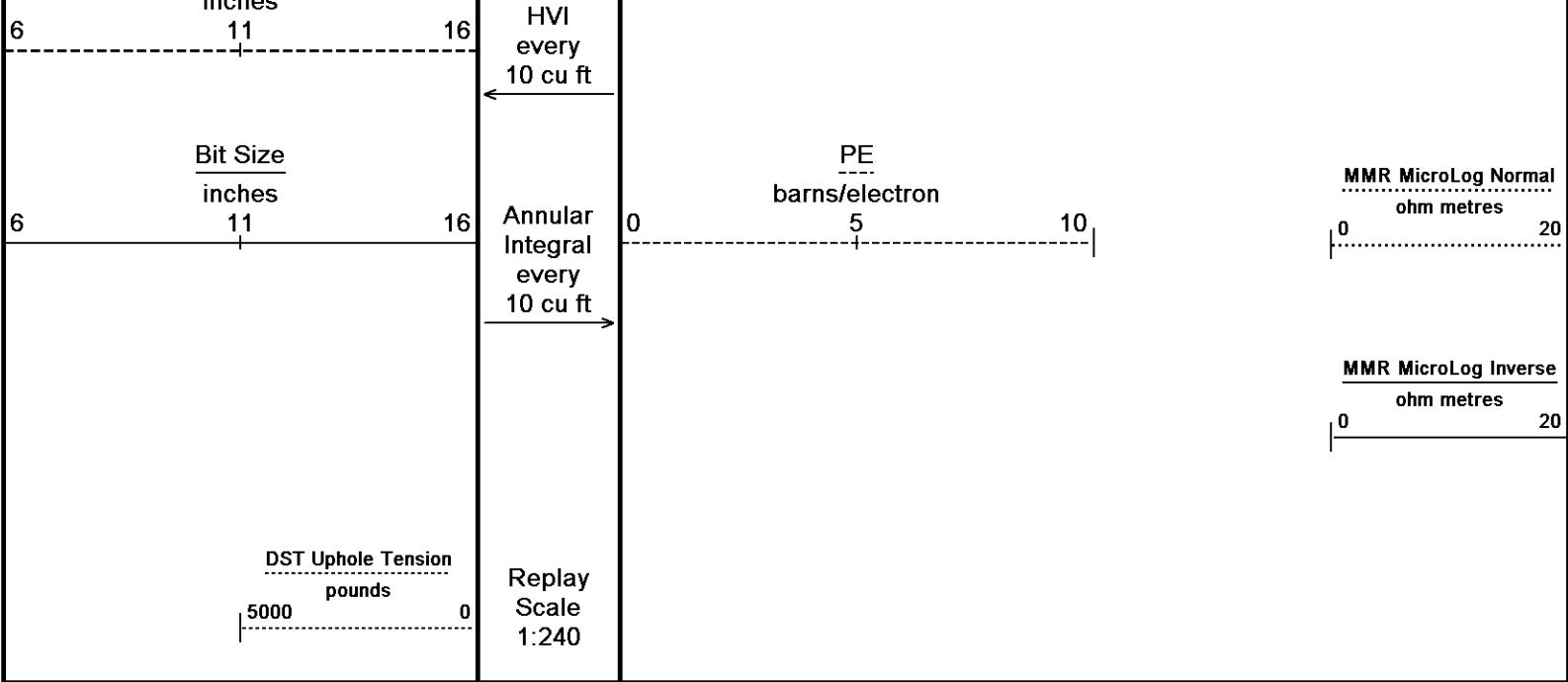
8500

Depth In Feet



Borehole Temp in deg F





Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 29-APR-2018 20:54

Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_002.dtaRecorded on 29-APR-2018 15:30

System Versions: Logged with 18.01.5248Plotted with 18.01.5248

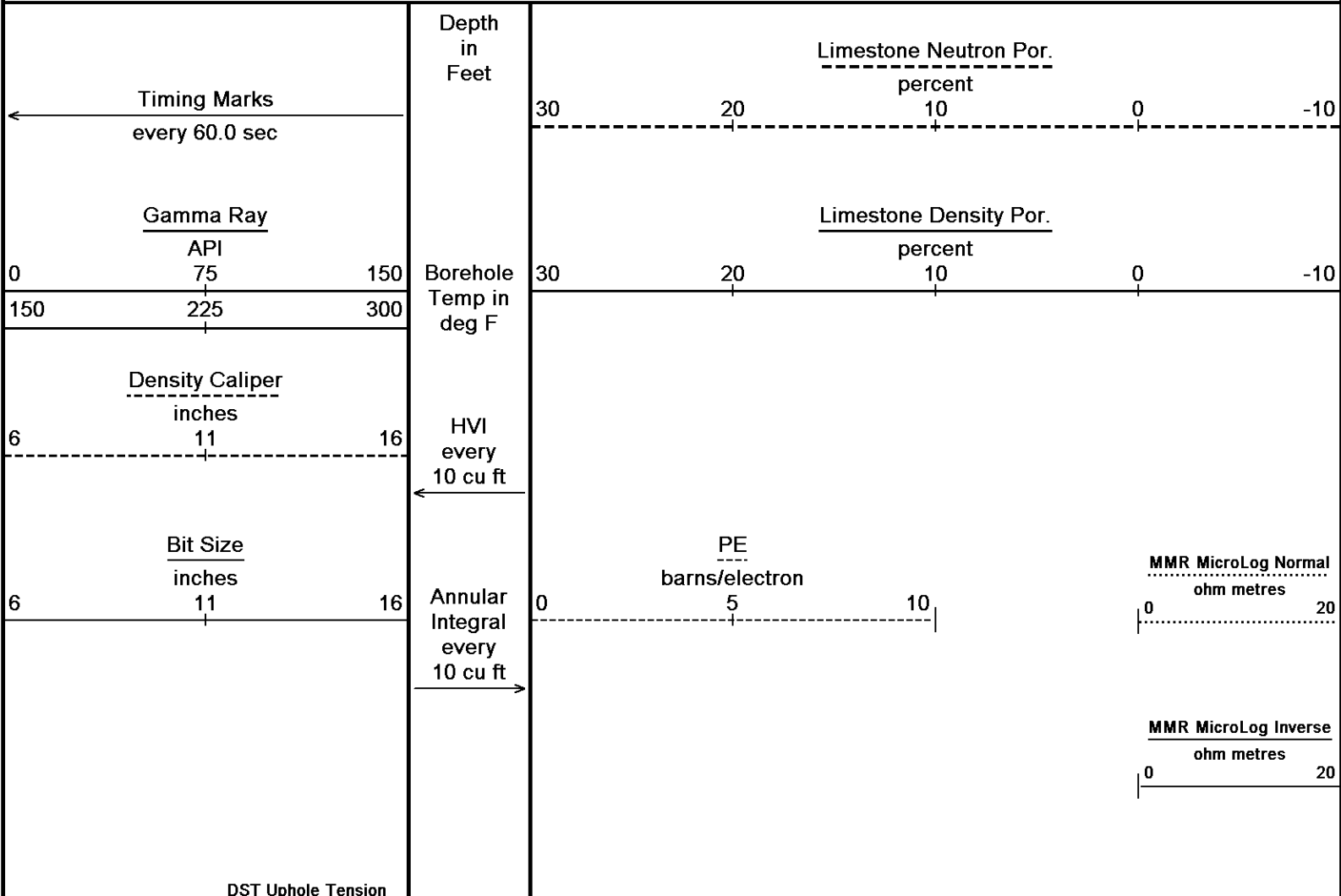
↑5 INCH LIMESTONE MAIN↑

↓REPEAT SECTION↓

Depth Based Data - Maximum Sampling Increment 10.0cmPlotted on 29-APR-2018 20:54

Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_001.dtaRecorded on 29-APR-2018 15:05

System Versions: Logged with 18.01.5248Plotted with 18.01.5248



5000 pounds 0

Replay
Scale
1:240

8200

187°

8250

188°

8300

187°

8350

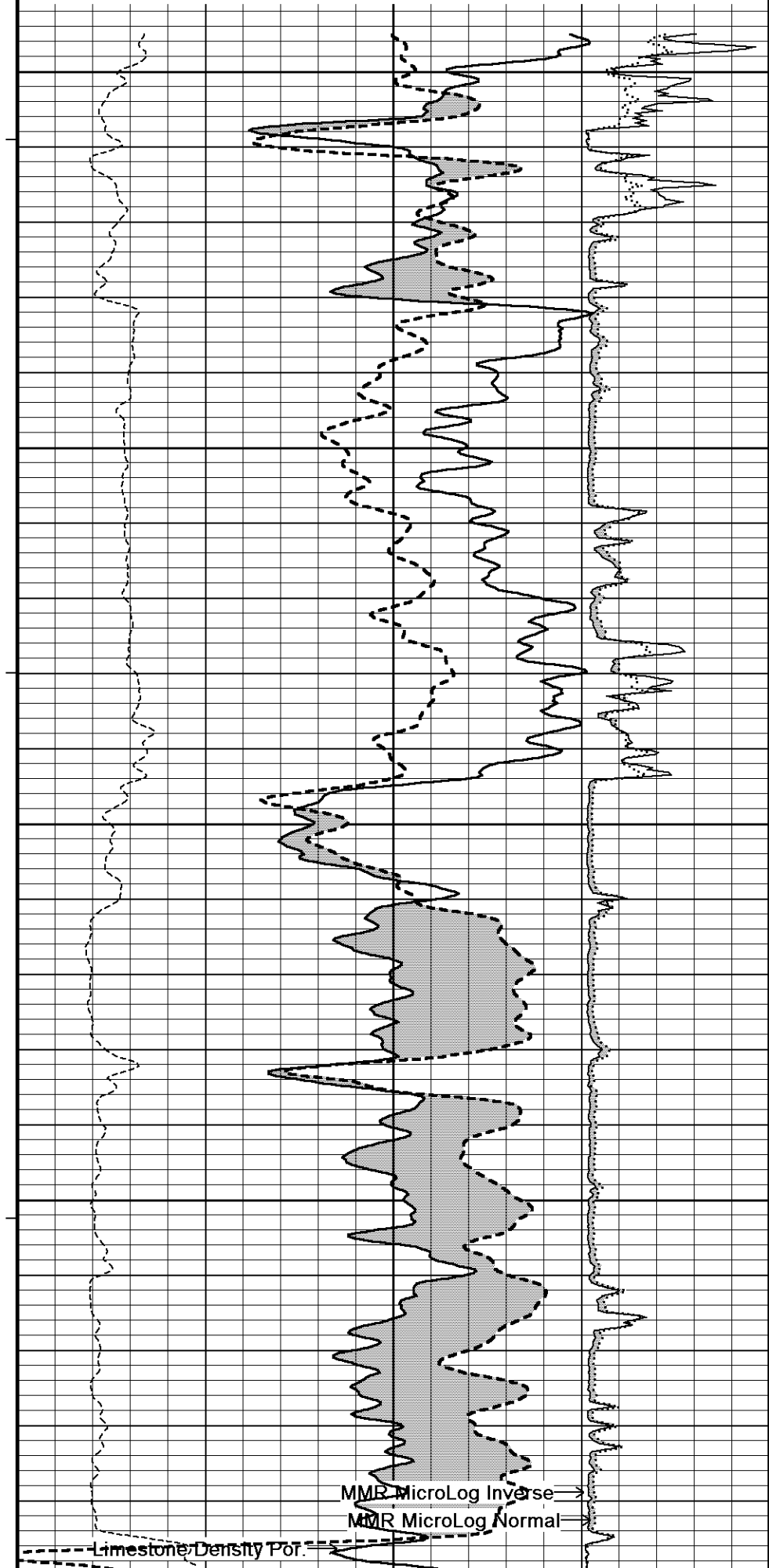
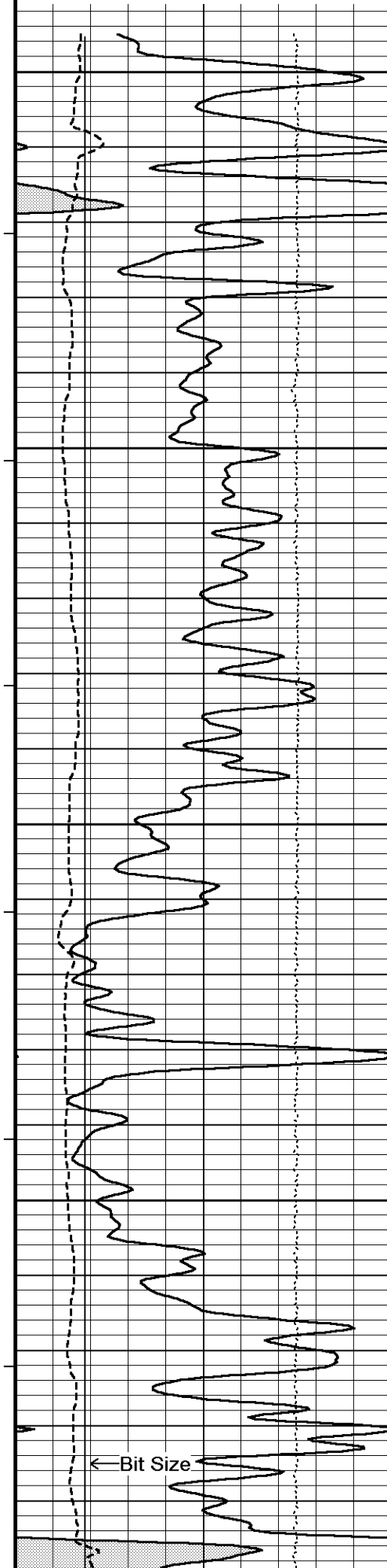
186°

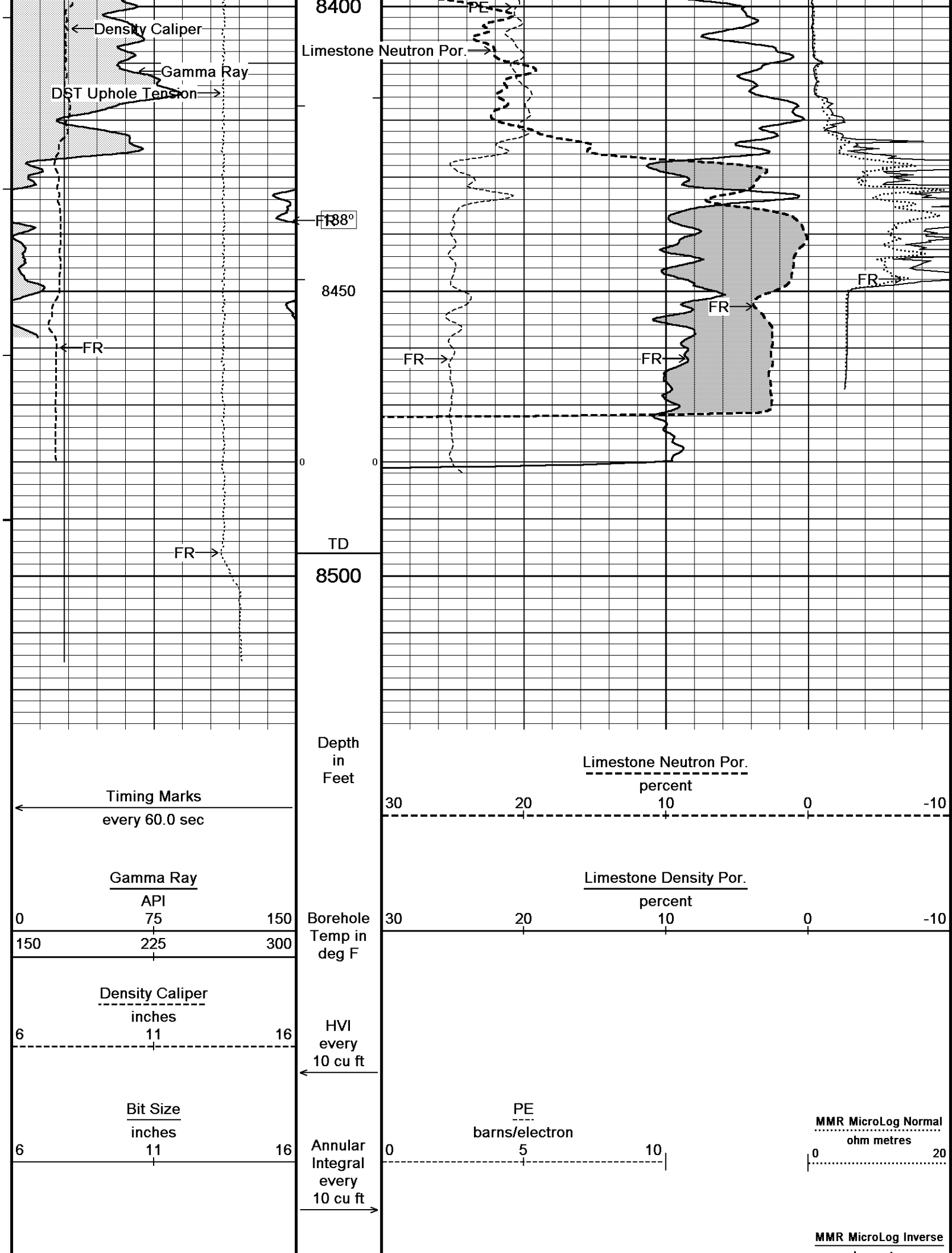
← Bit Size

MMR MicroLog Inverse →

MMR MicroLog Normal →

← Limestone Density Por. →





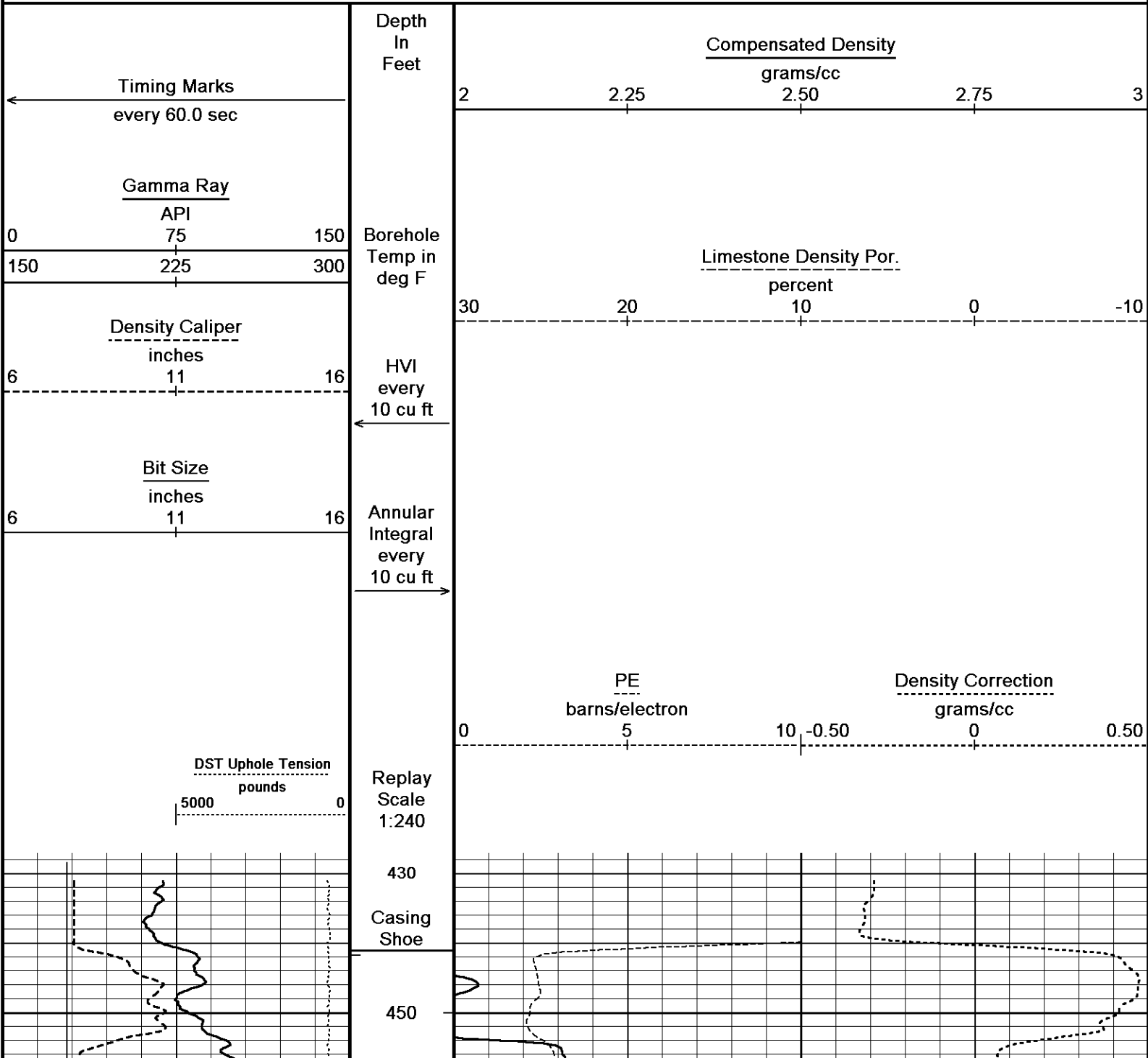
		0 ohm metres20
DST Uphole Tension pounds 50000	Replay Scale 1:240	

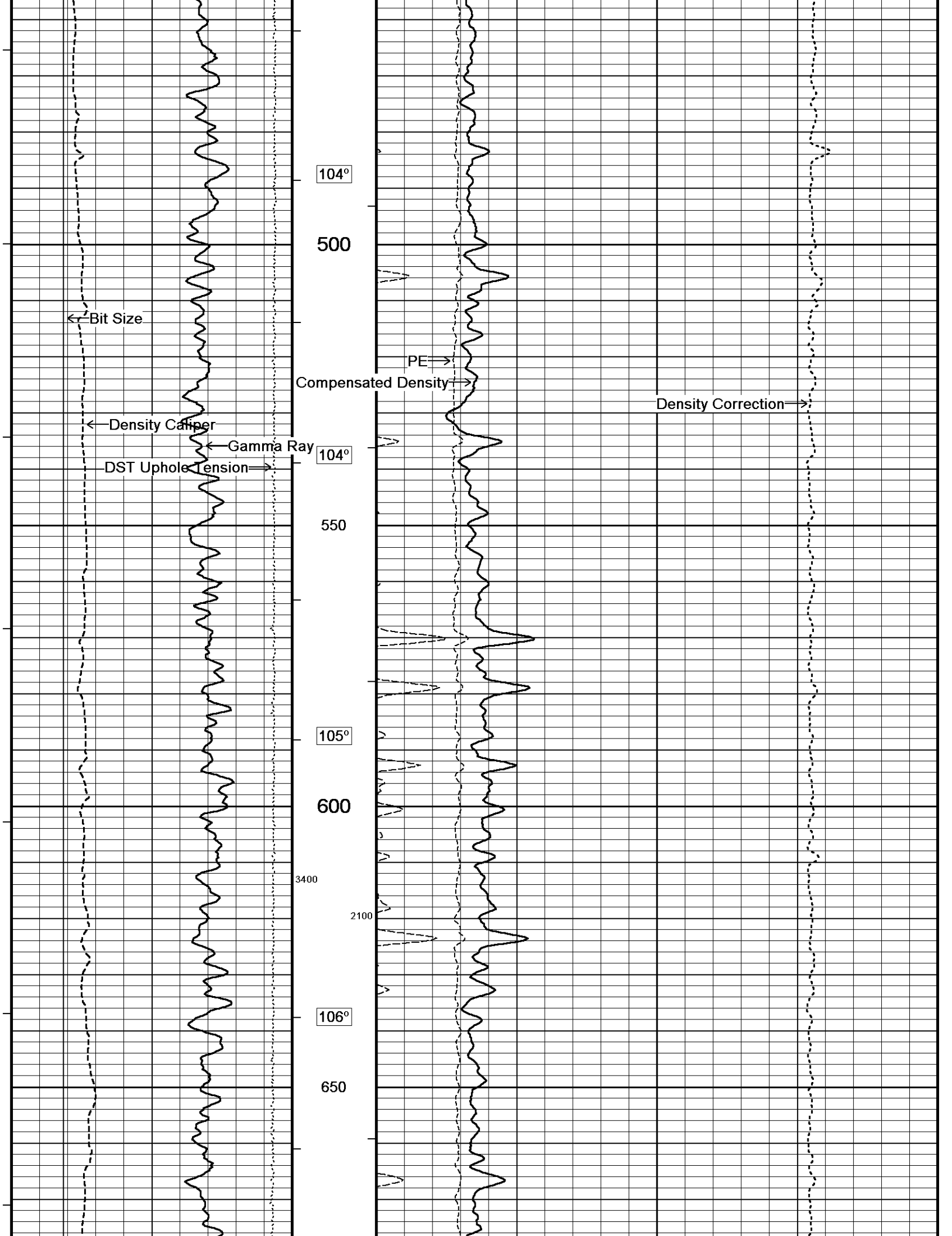
Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 29-APR-2018 20:54
Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_001.dta	Recorded on 29-APR-2018 15:05
System Versions: Logged with 18.01.5248 Plotted with 18.01.5248	

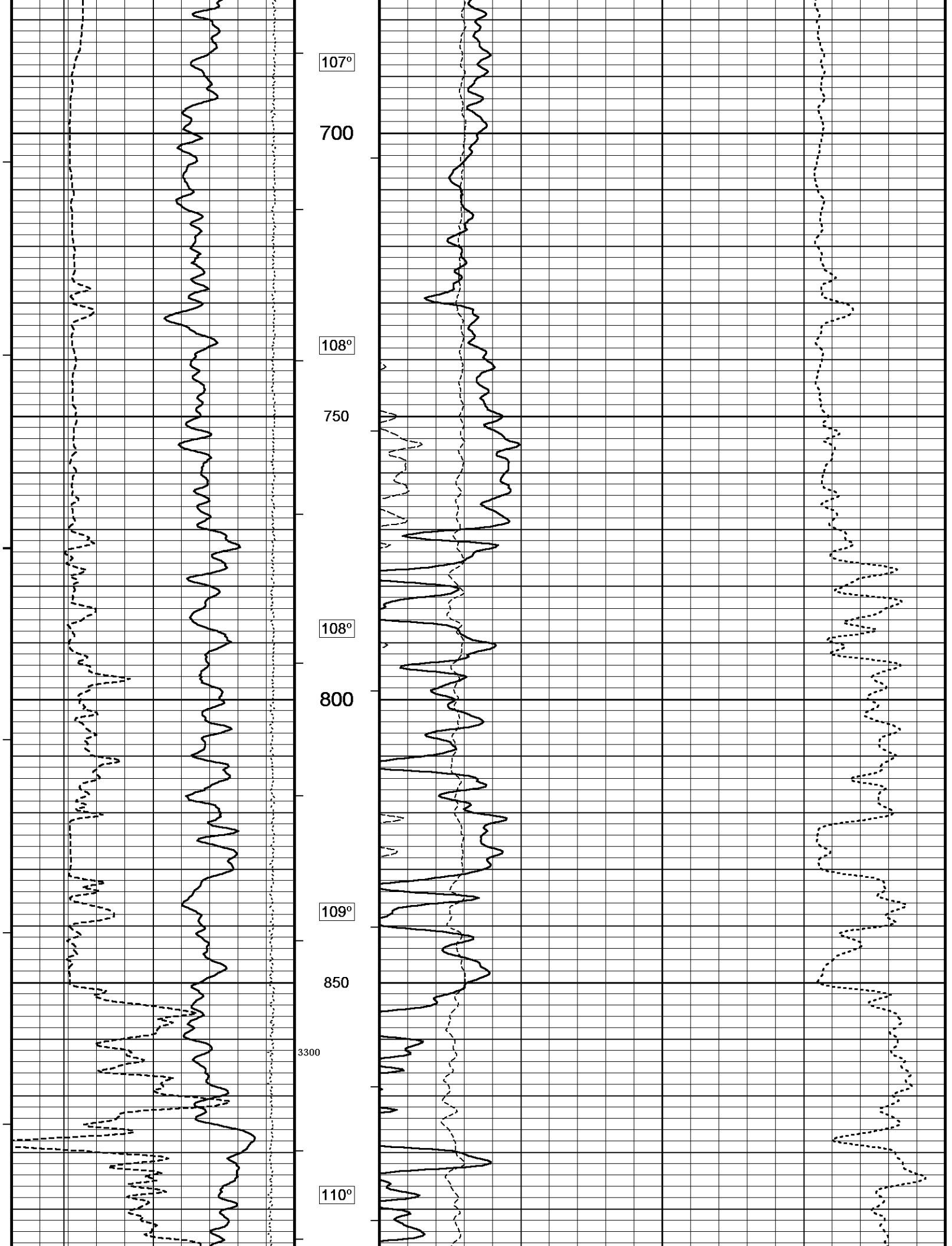
↑	REPEAT SECTION	↑
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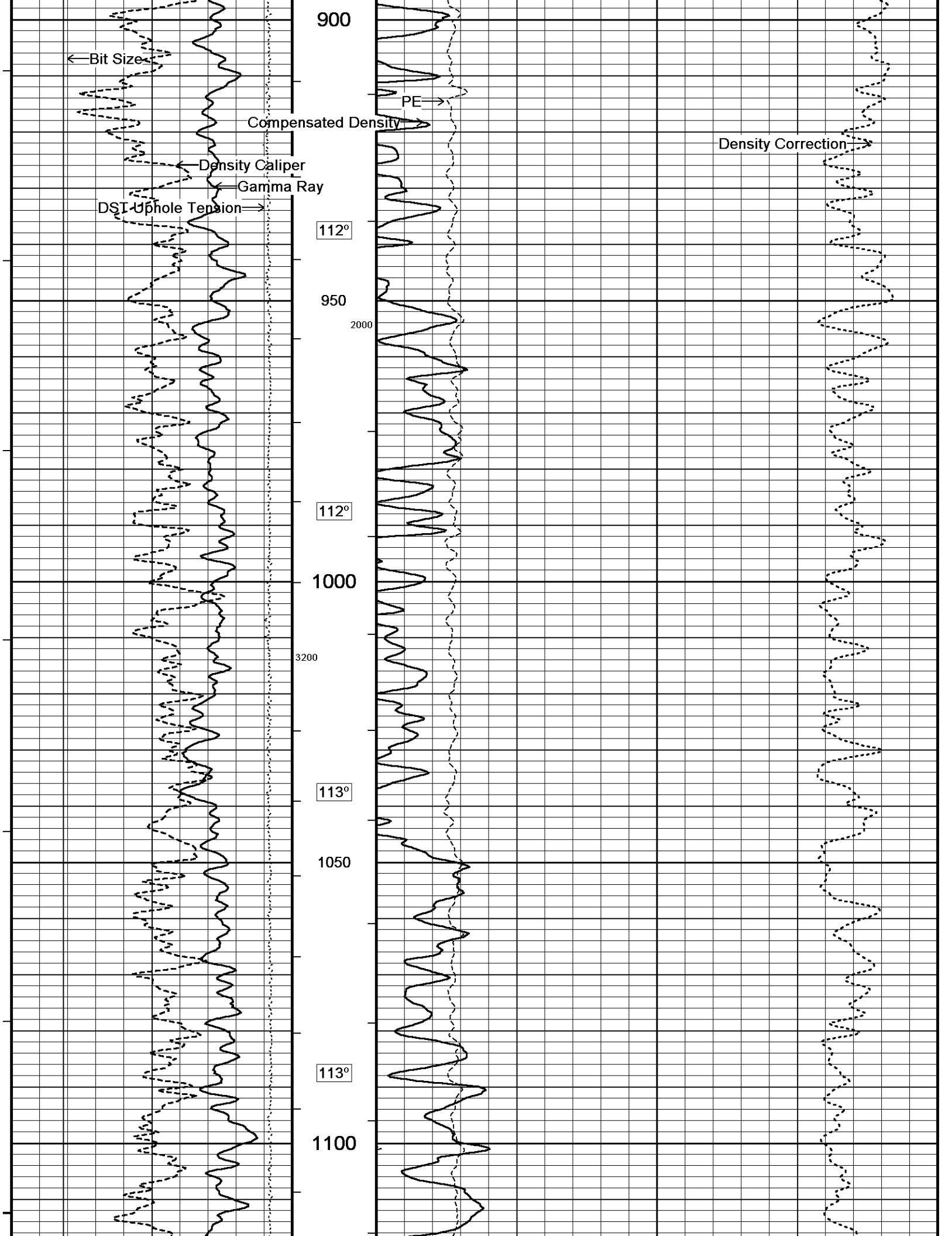
↓	5 INCH BULK DENSITY MAIN	↓
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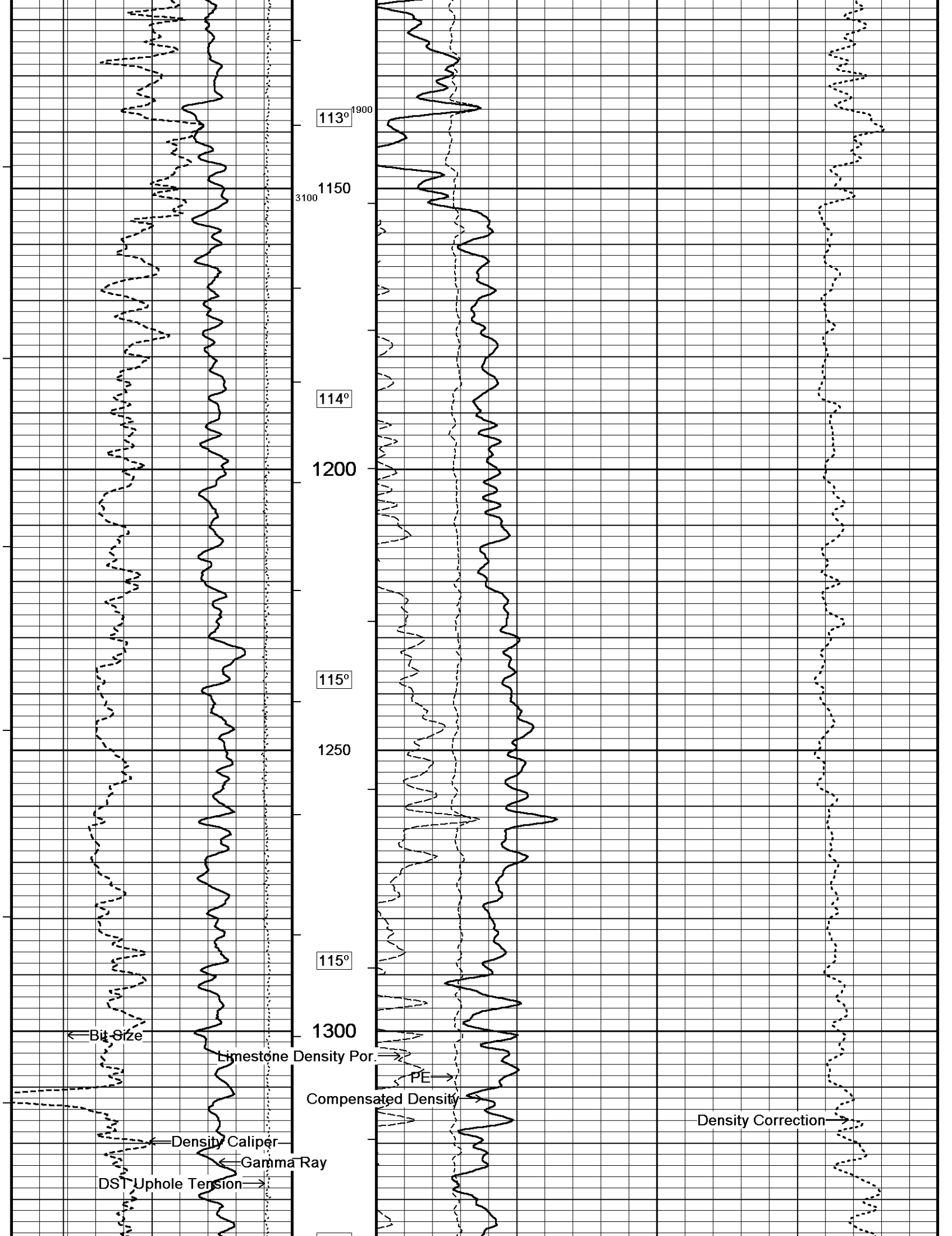
Depth Based Data - Maximum Sampling Increment 10.0cm	Plotted on 29-APR-2018 20:54
Filename: C:\Minimus 18.01.5248\Data\Grand Mesa Crater La...\Grand Mesa Crater Lake #1-8_002.dta	Recorded on 29-APR-2018 15:30
System Versions: Logged with 18.01.5248 Plotted with 18.01.5248	

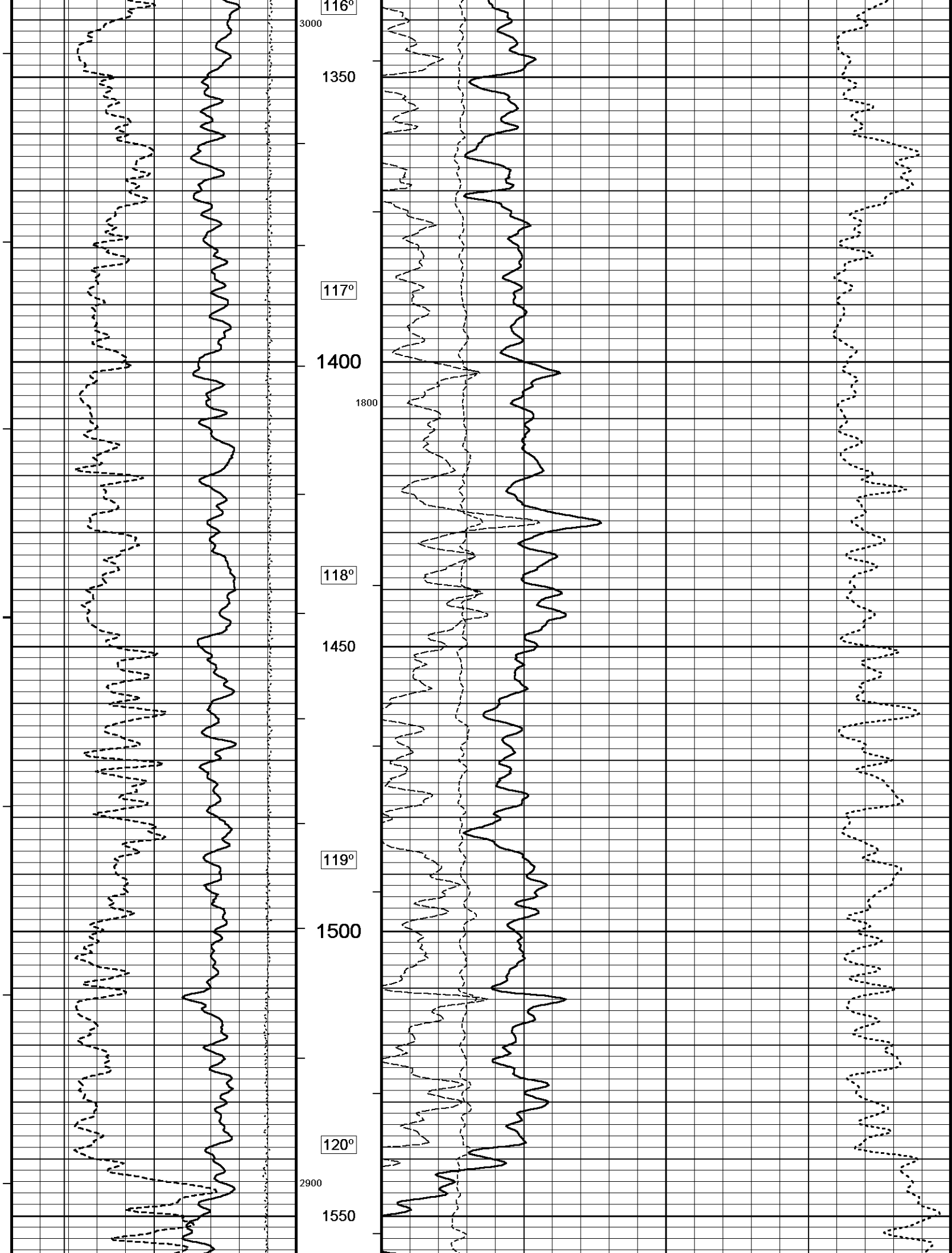


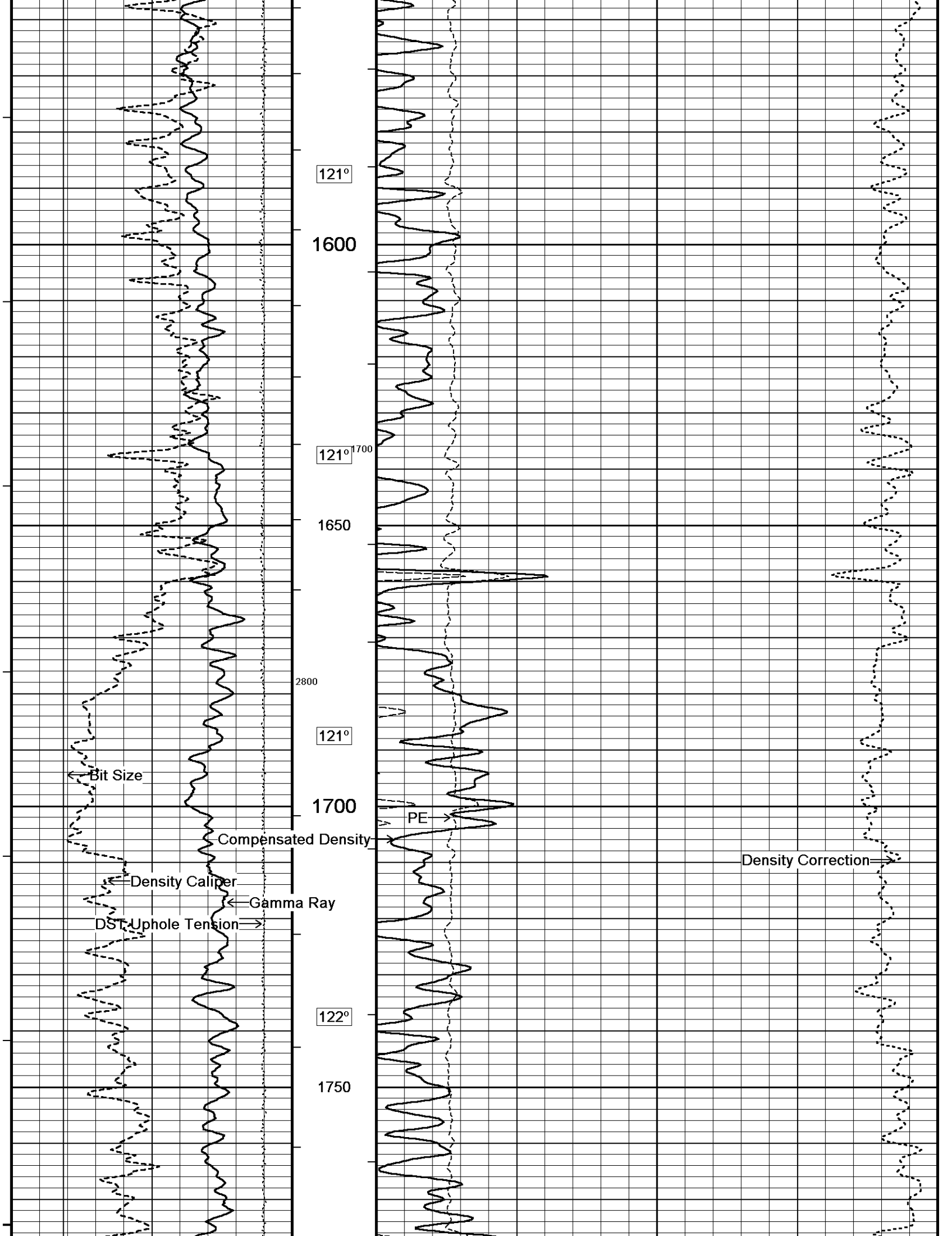


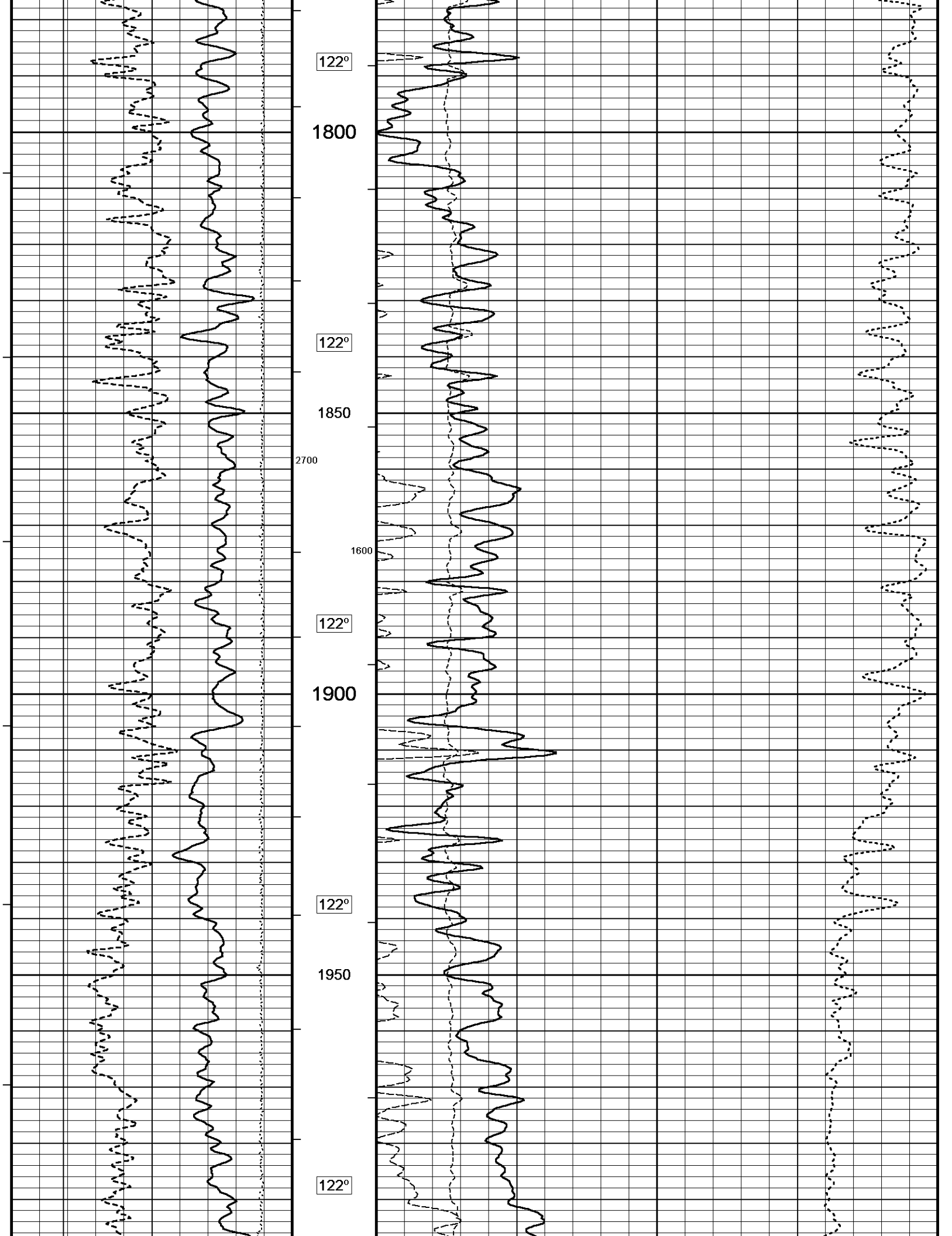


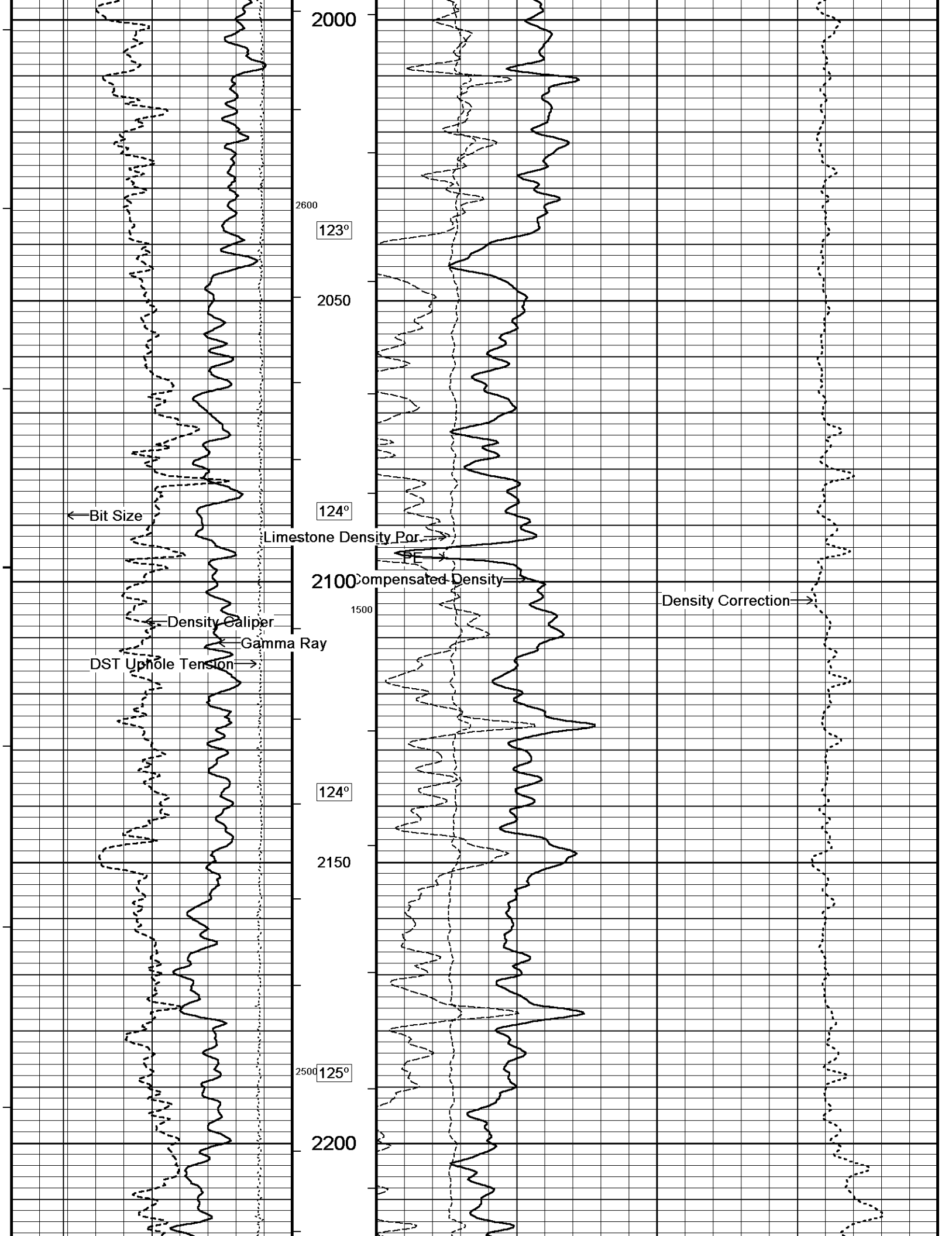


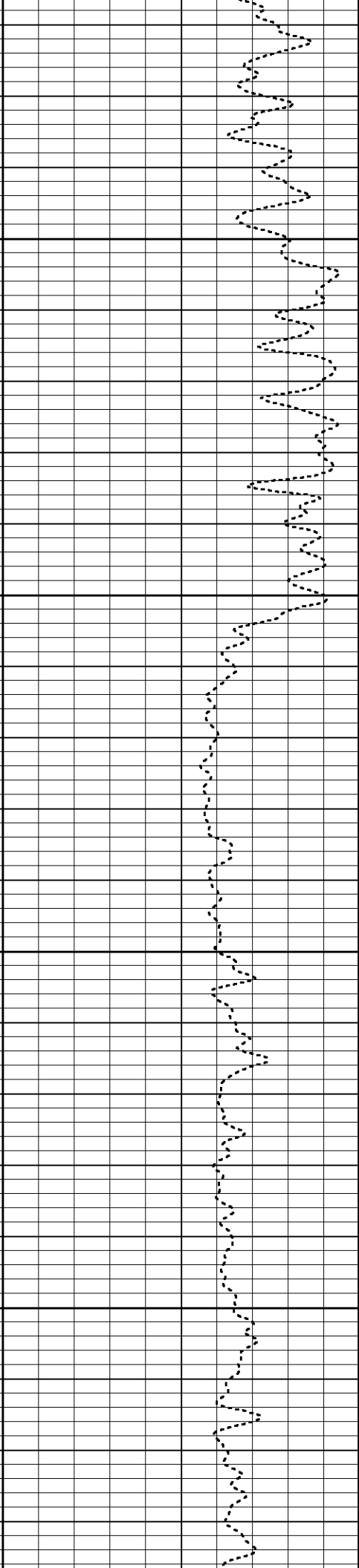
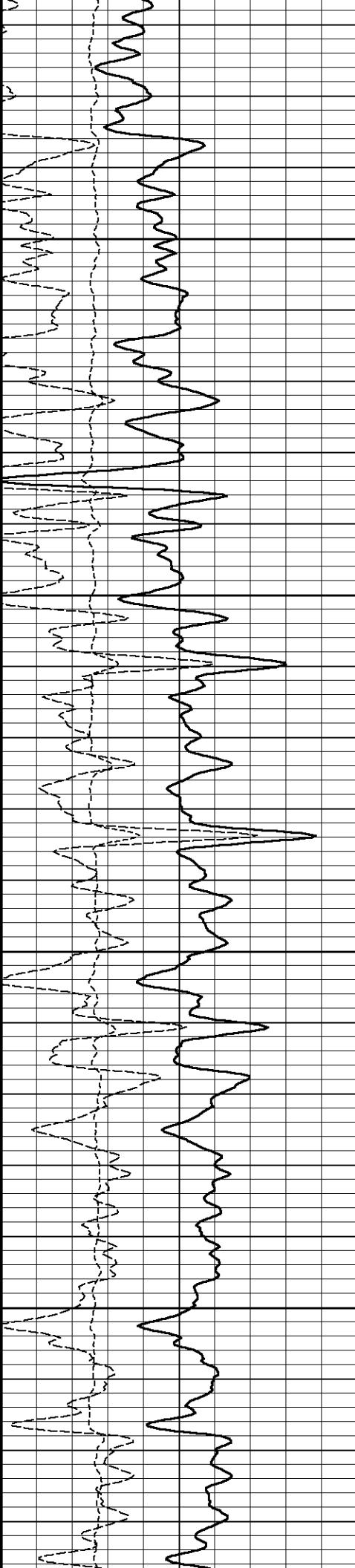
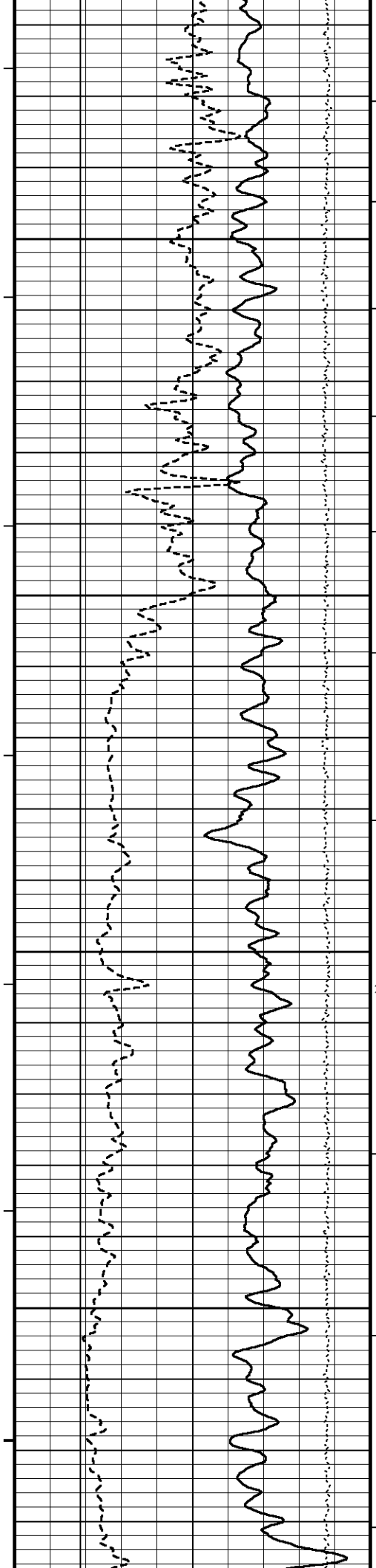


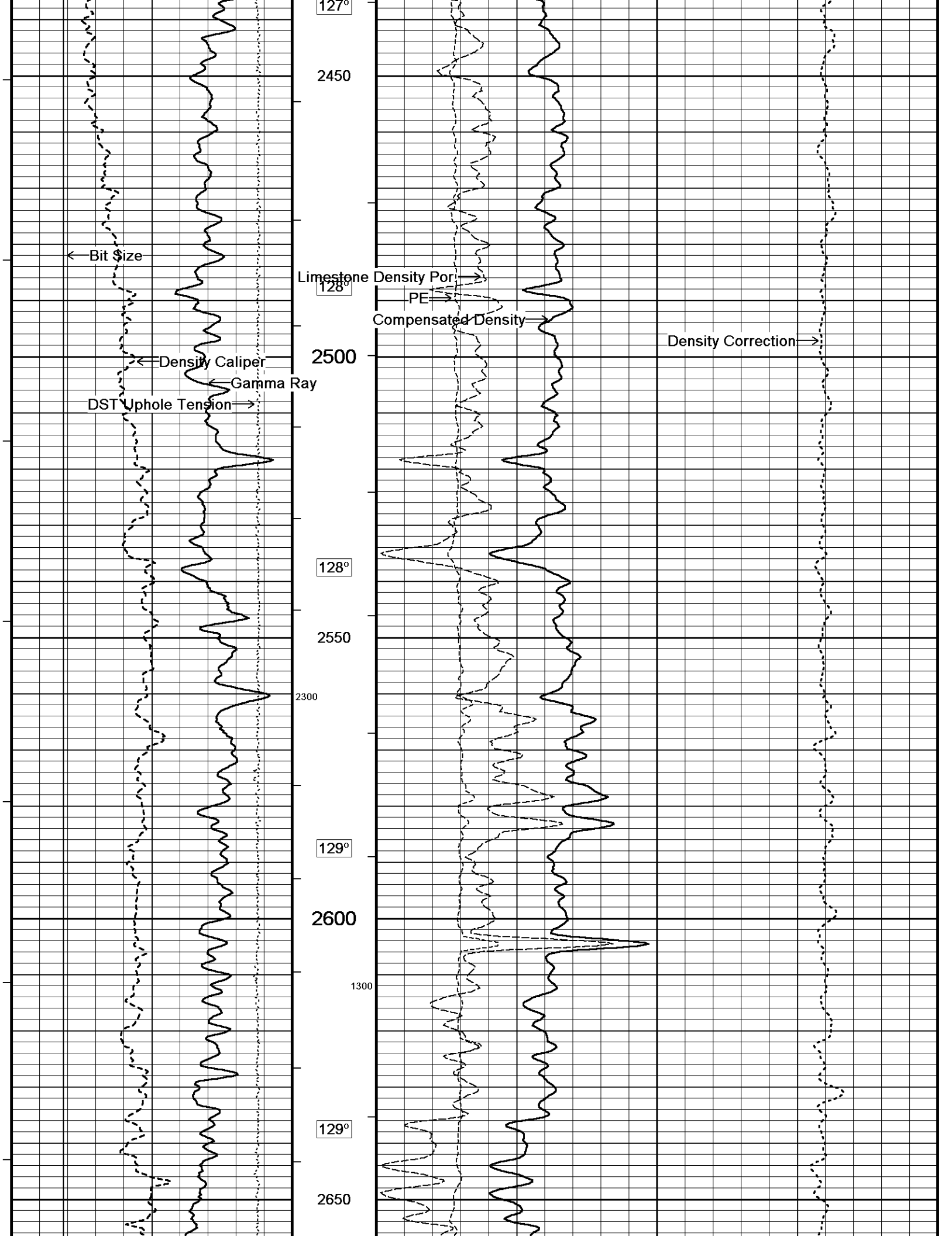


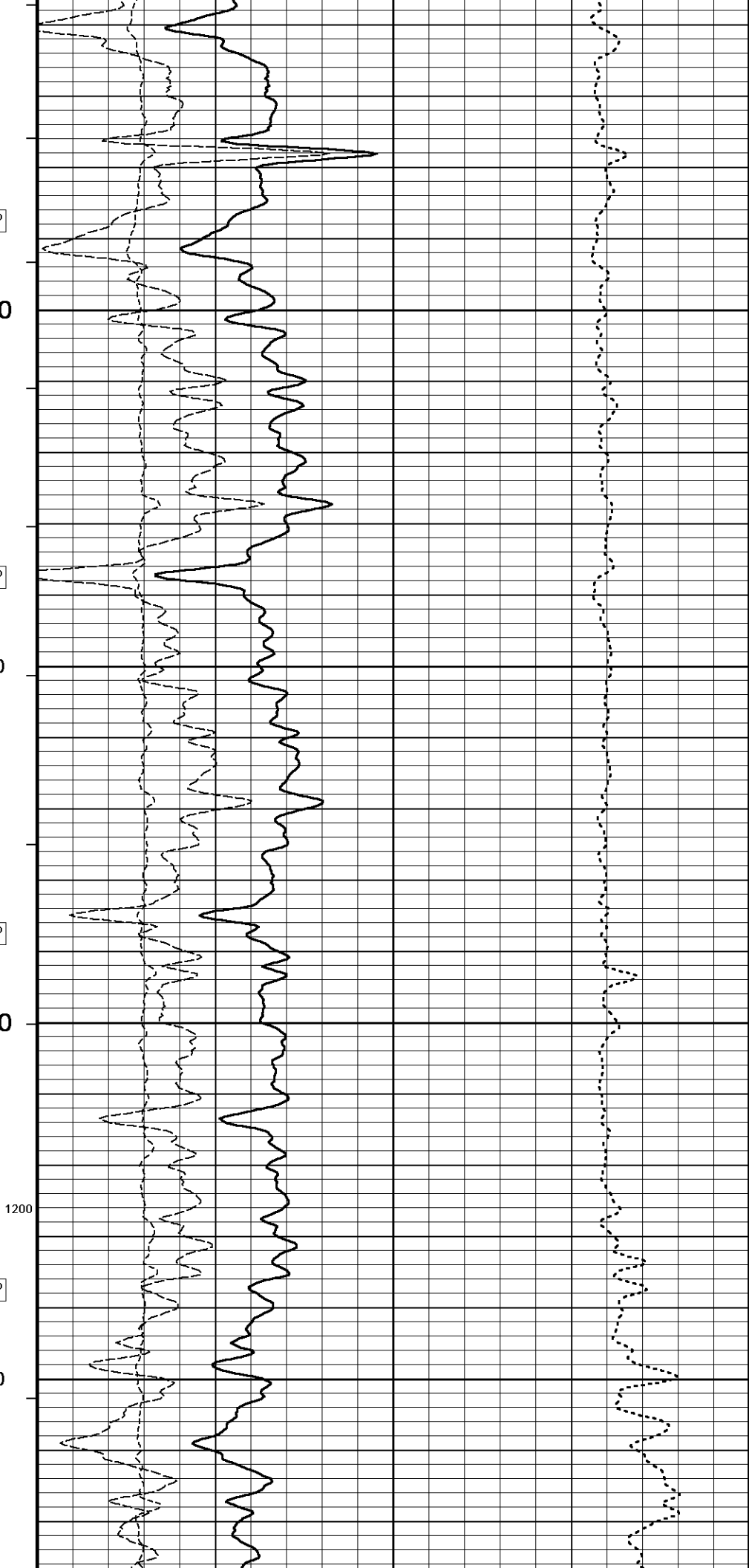
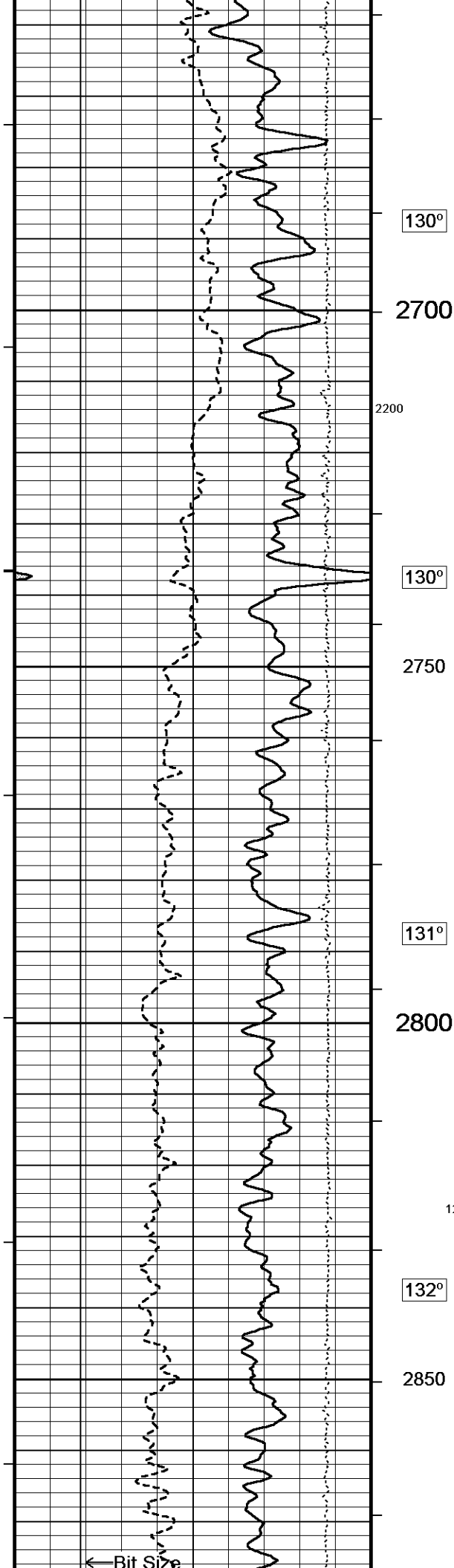


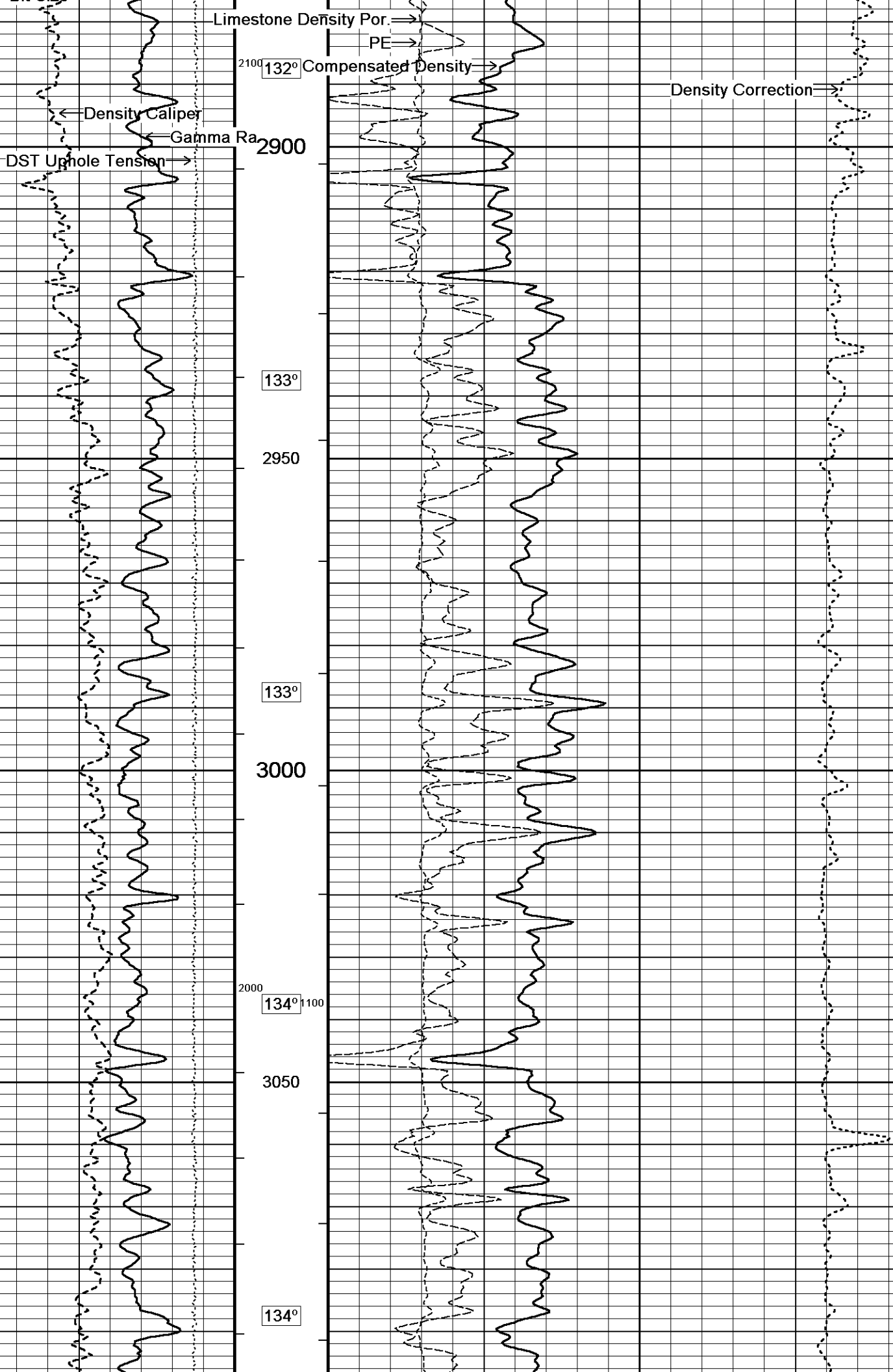


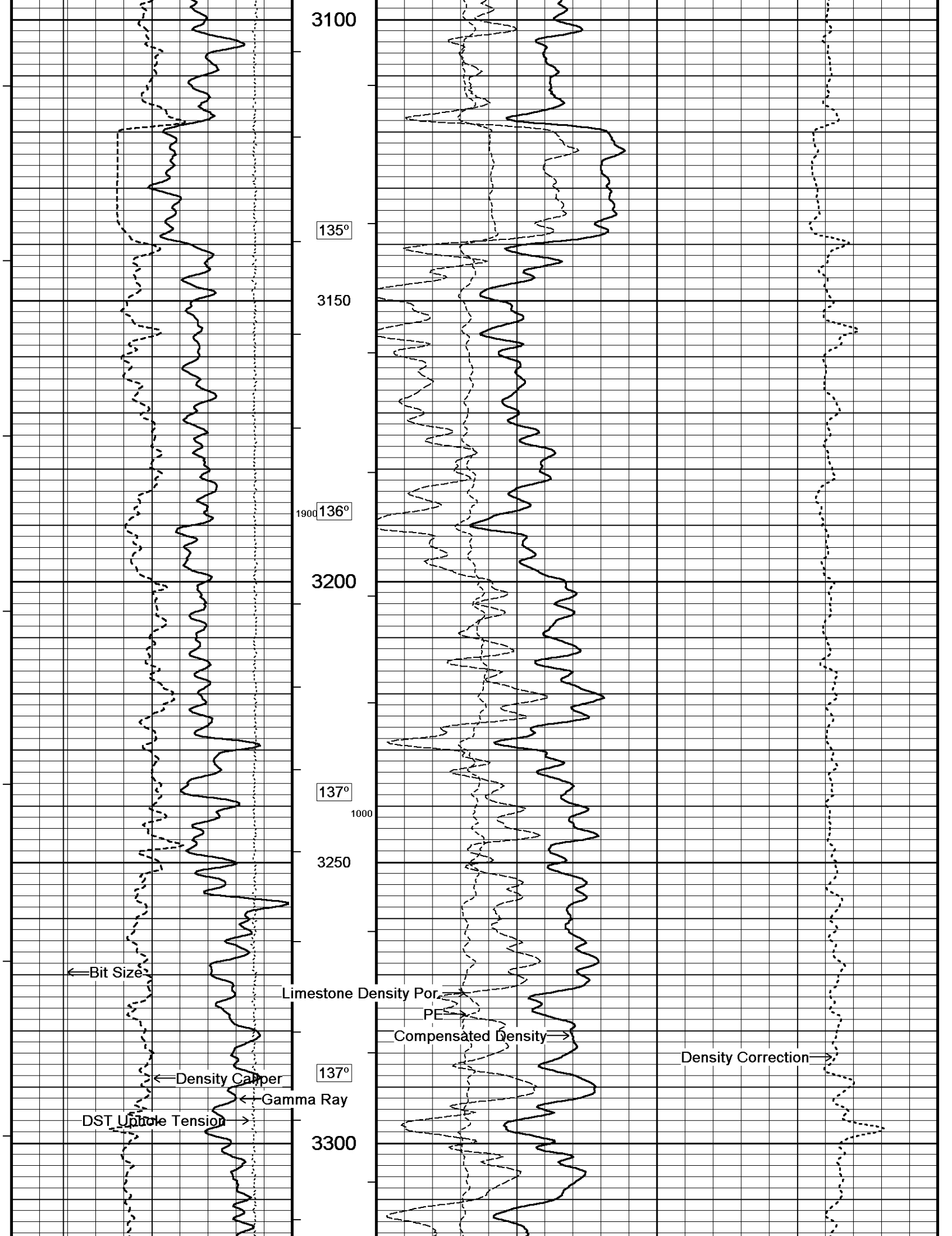


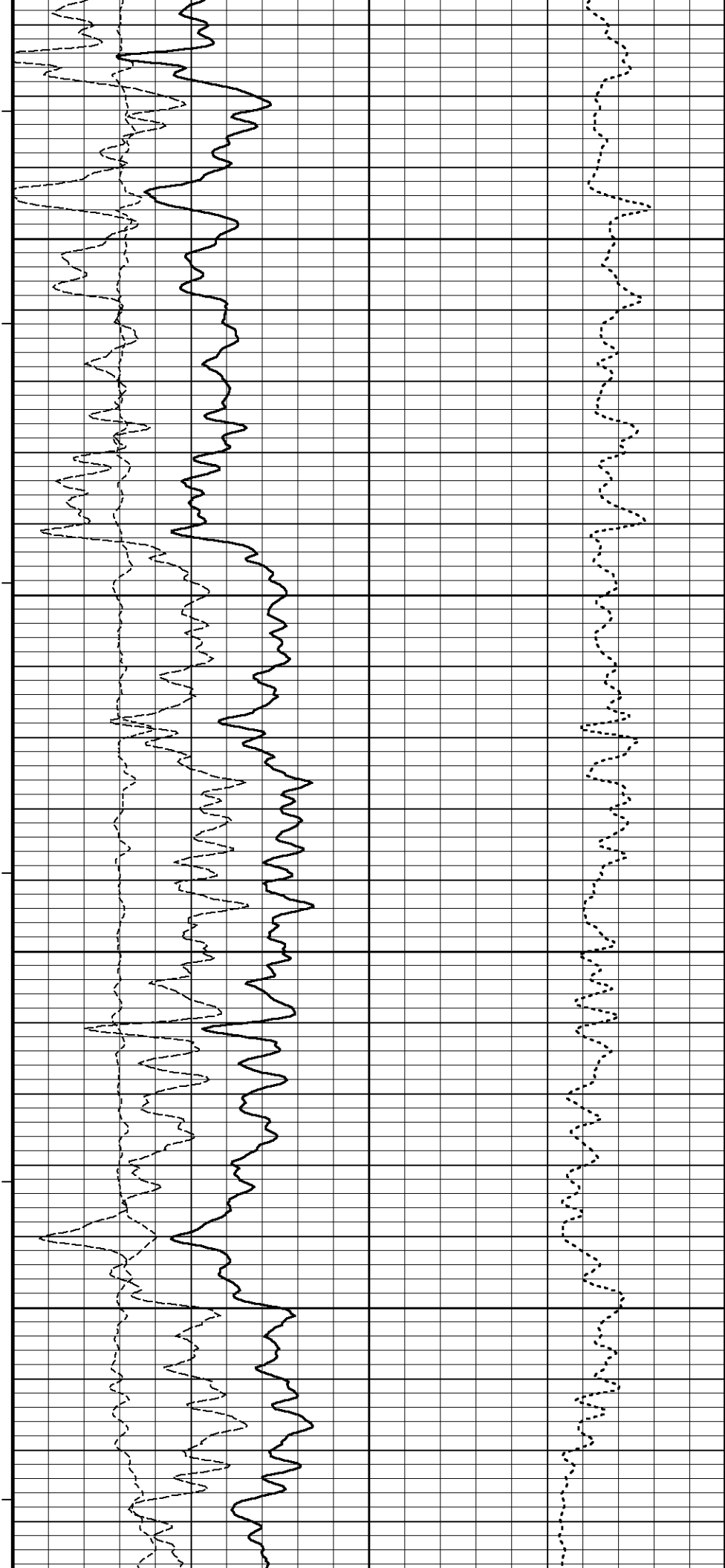
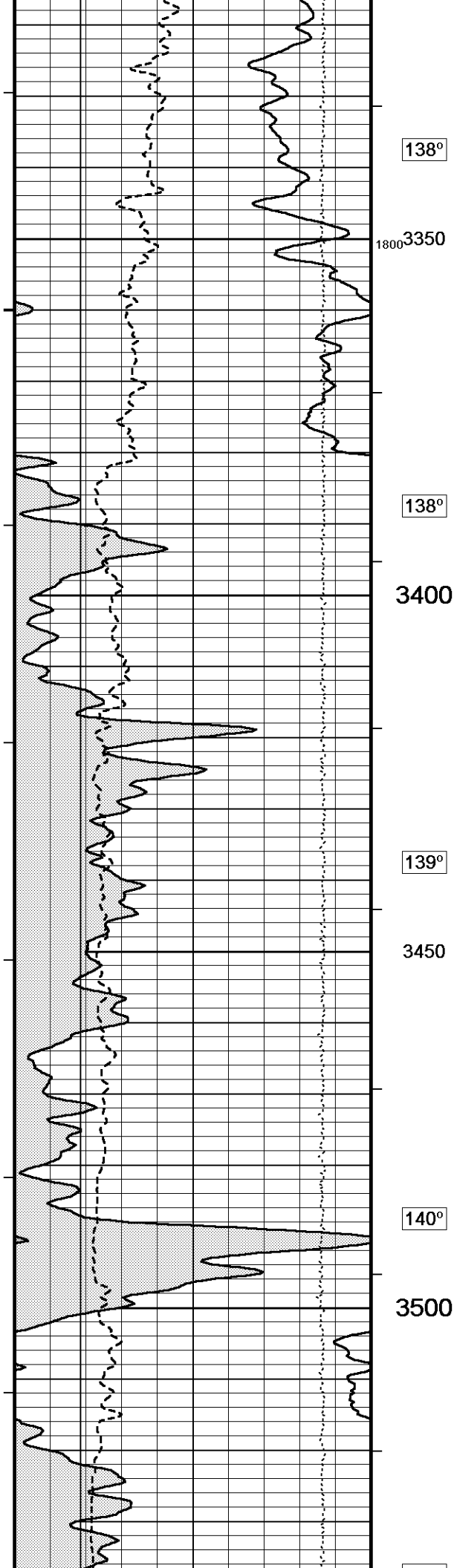


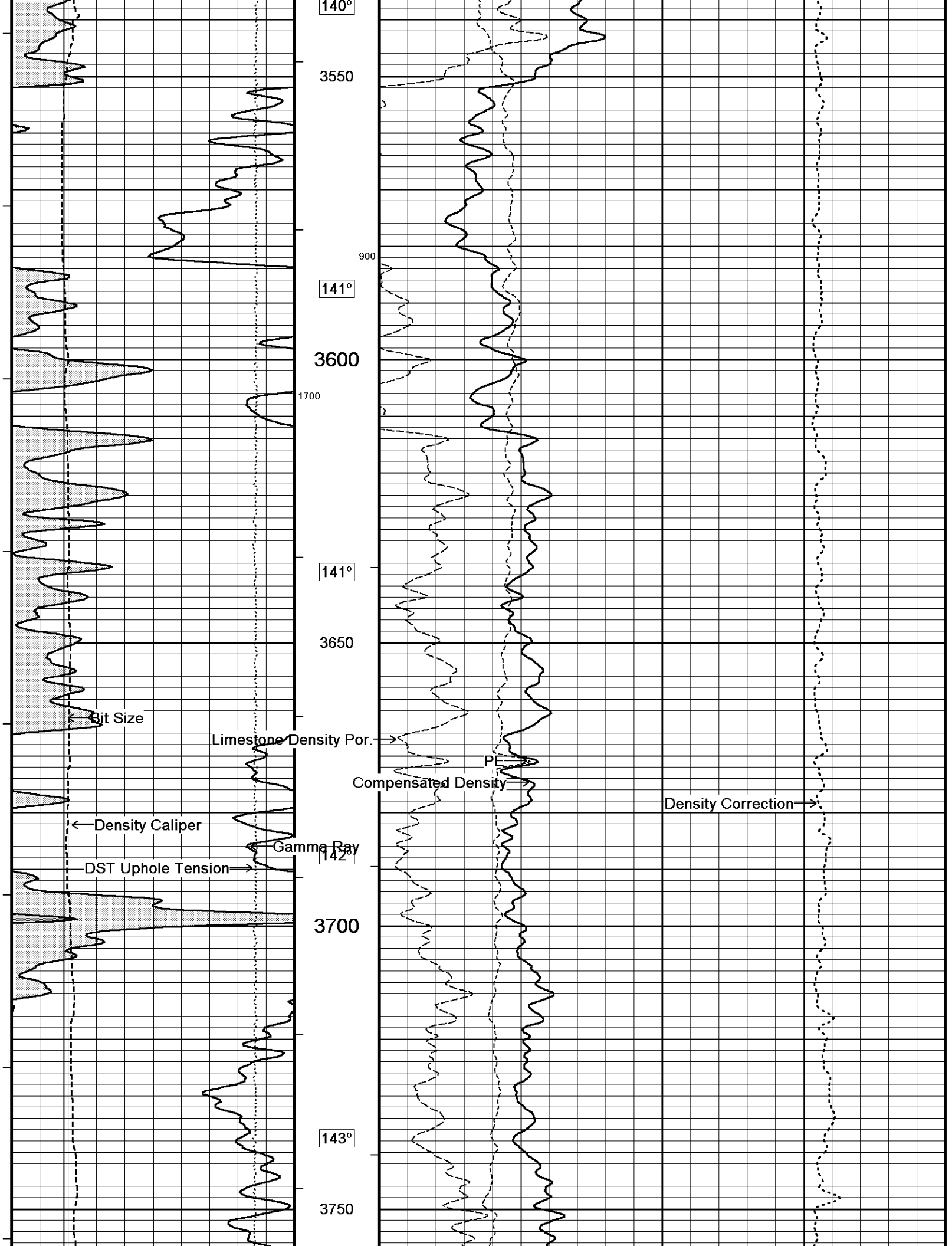


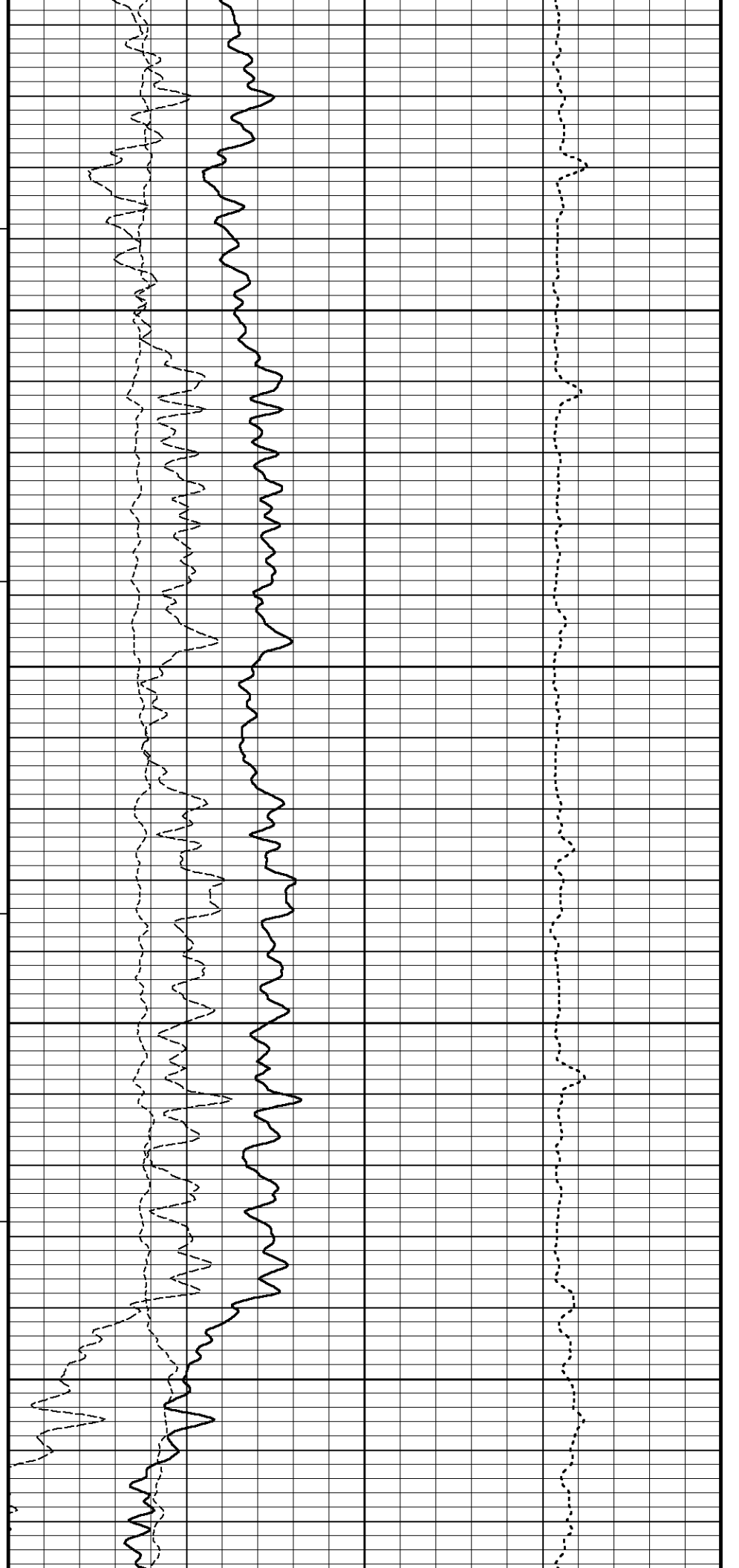
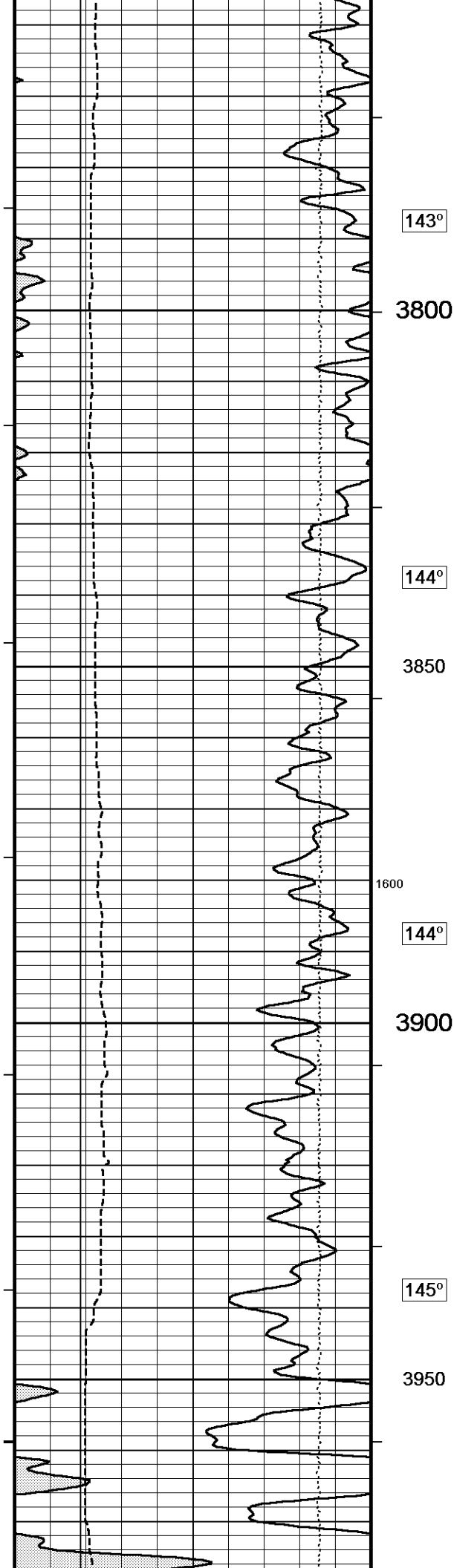


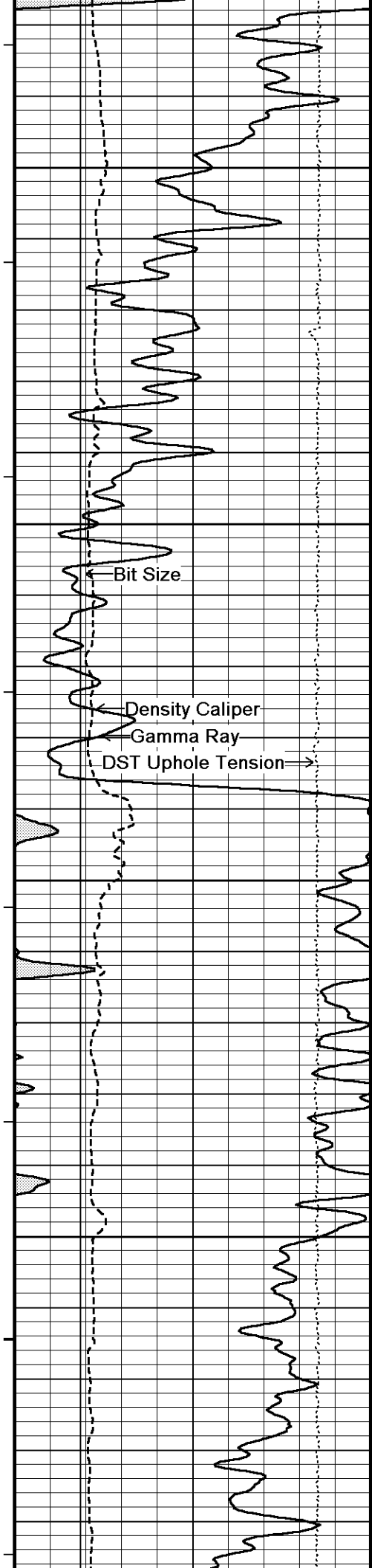




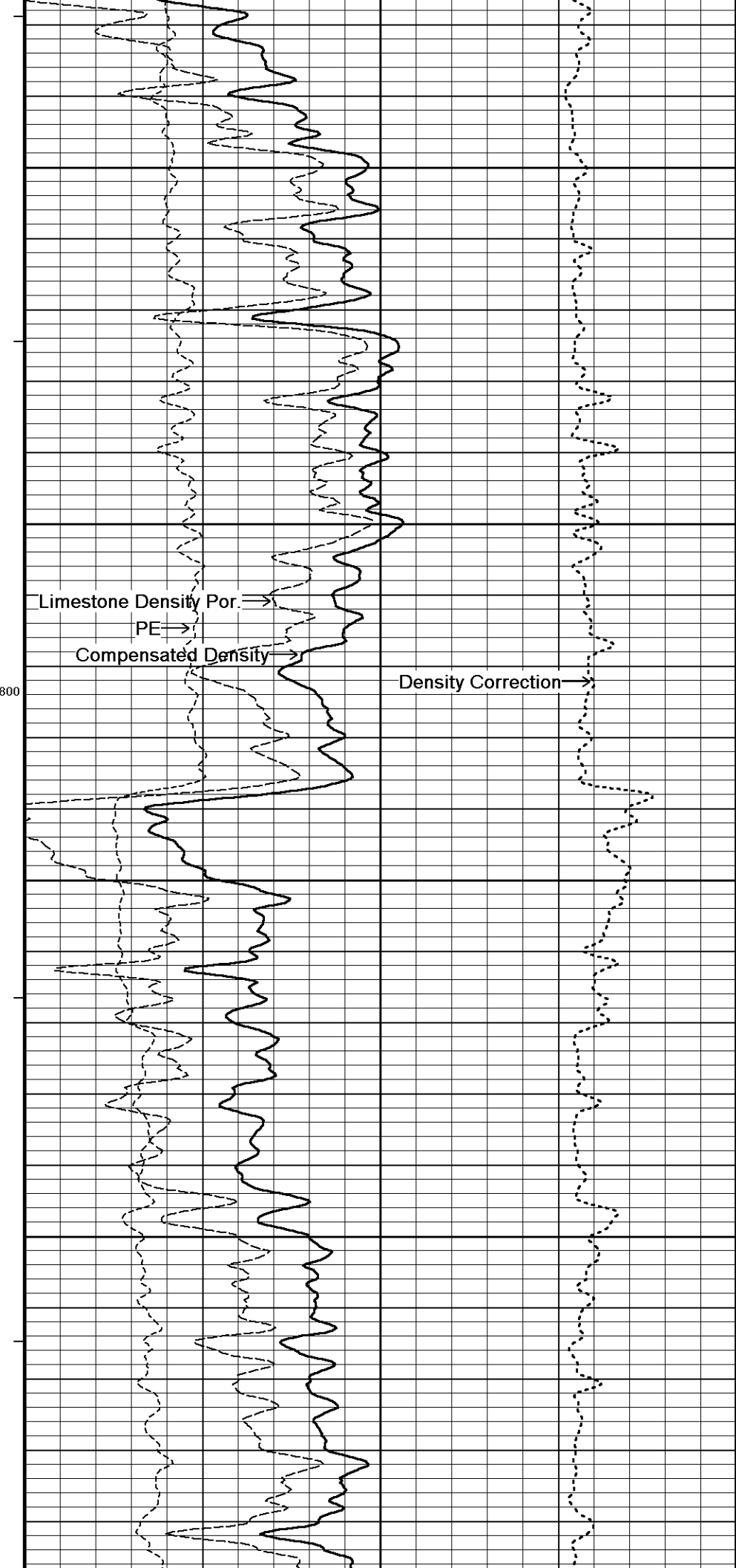


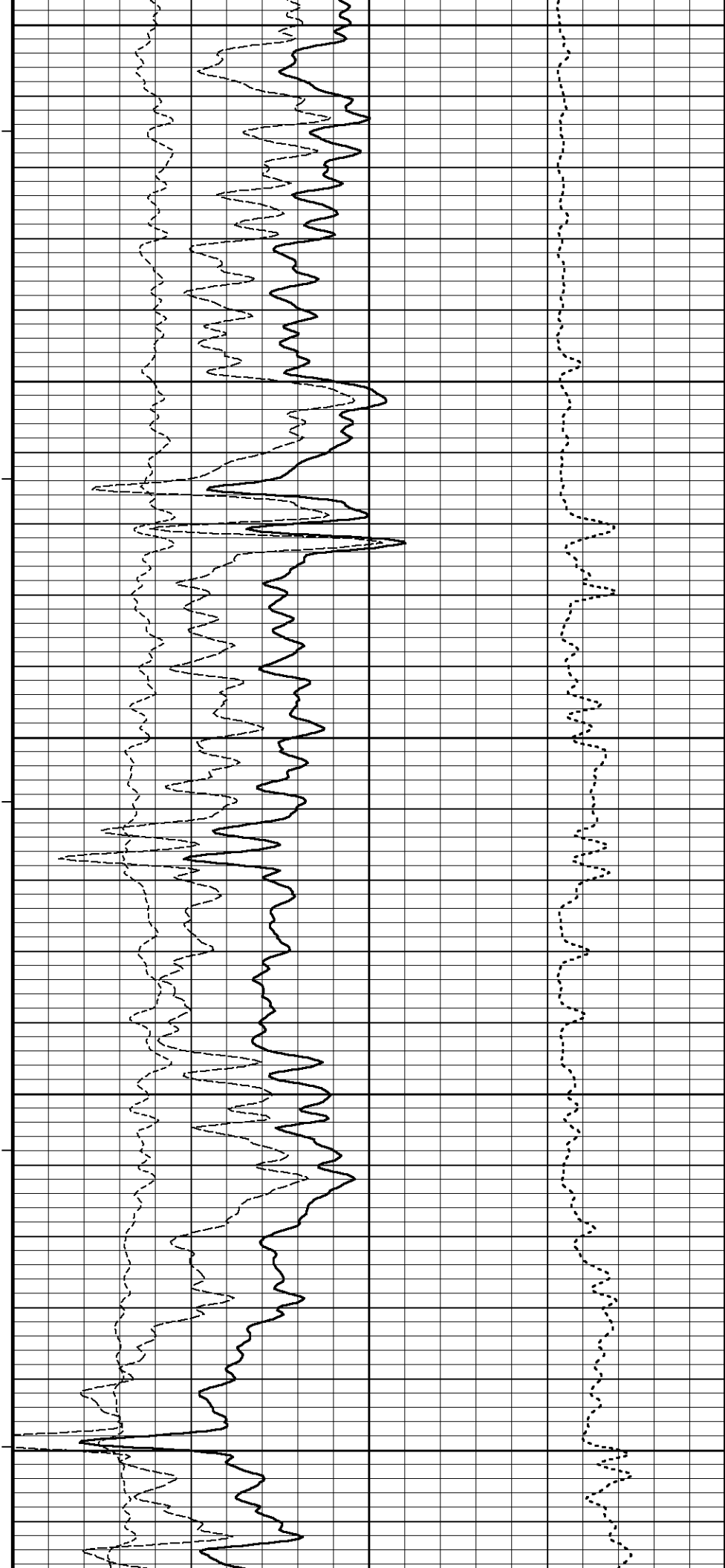
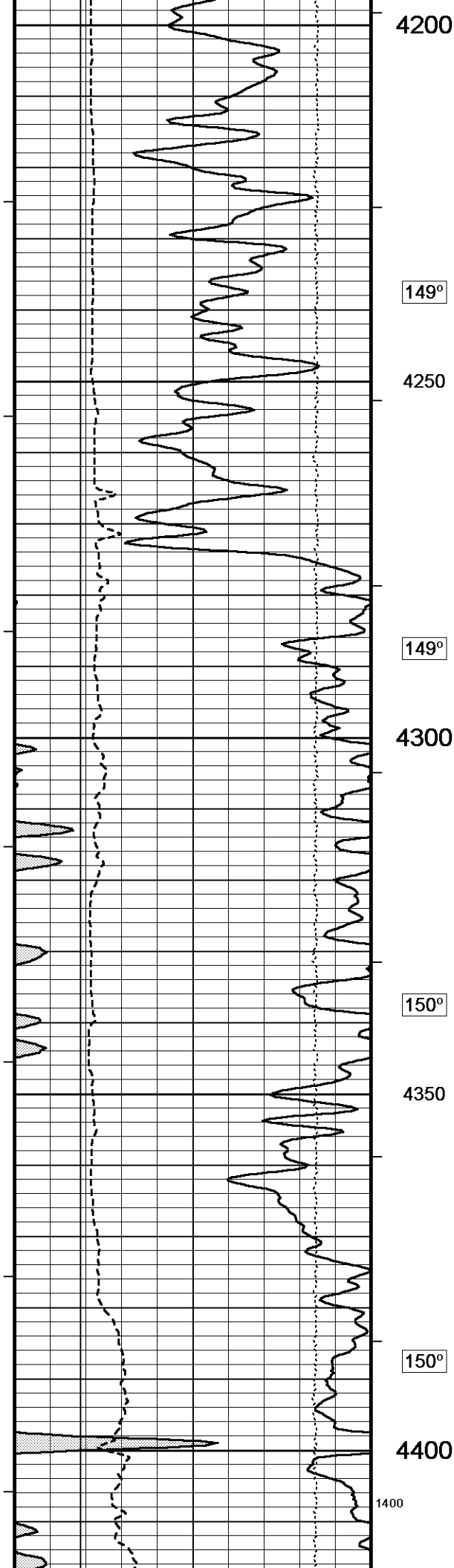


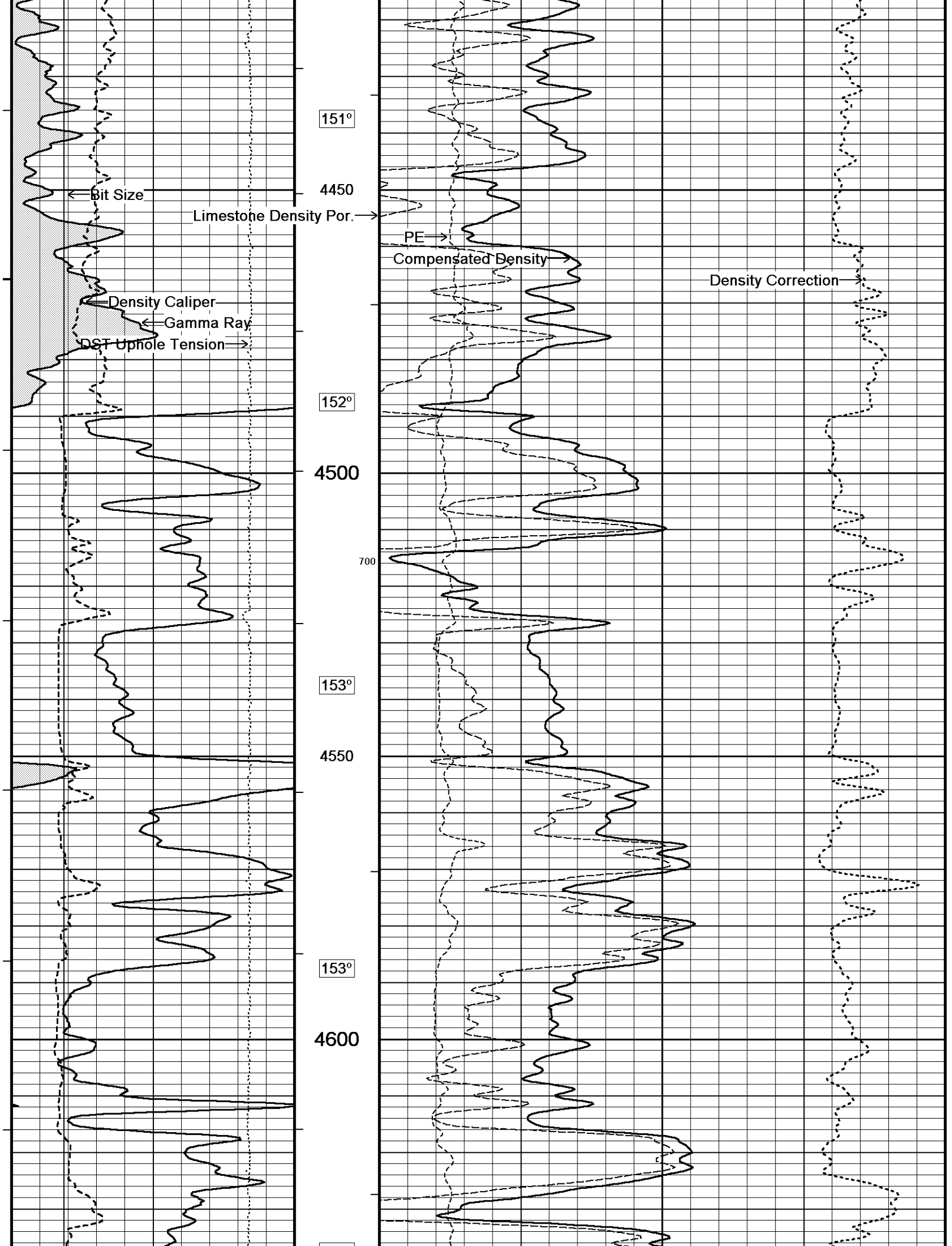


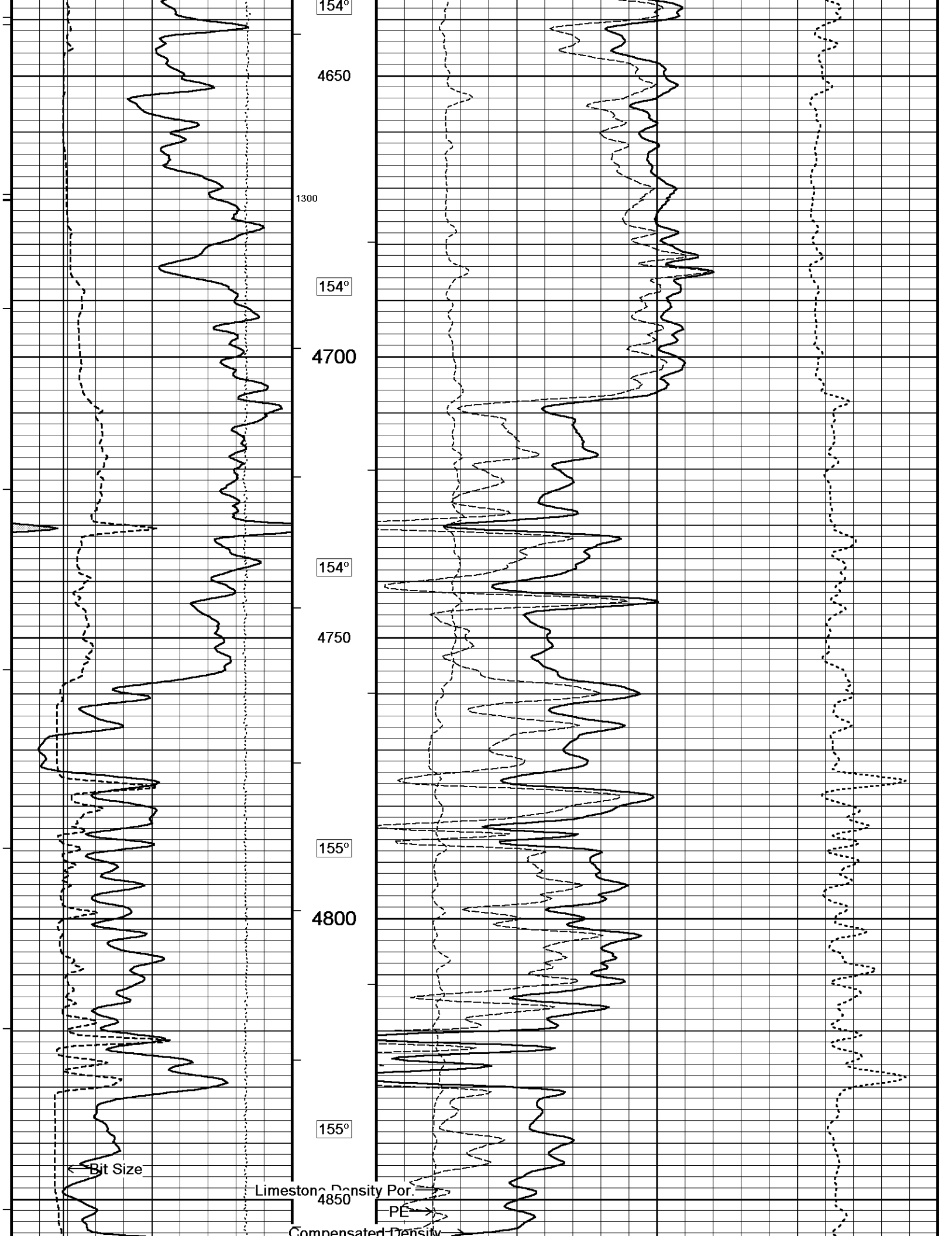


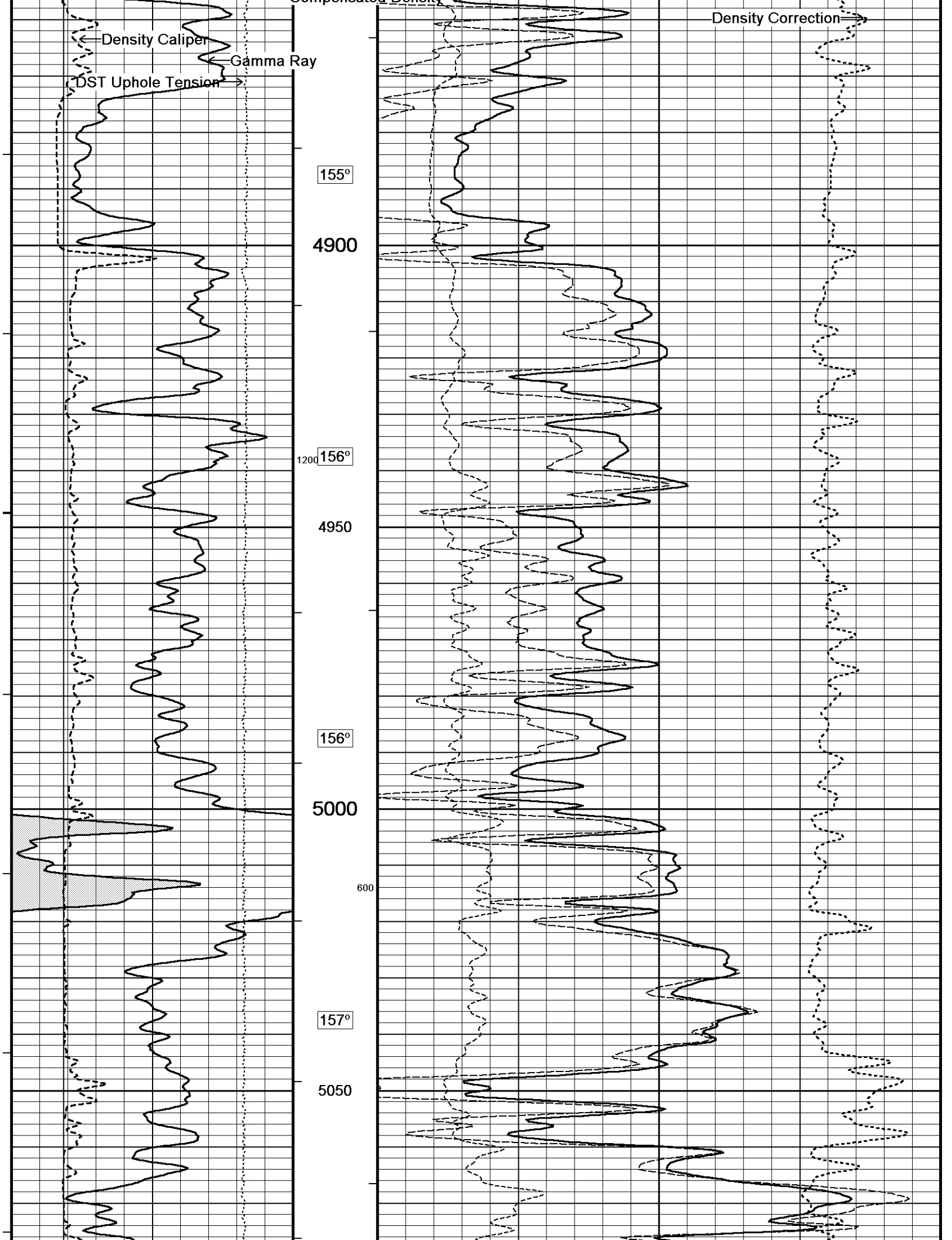
146°
4000
146°
4050
800
147°
4100
147°
1500
4150
148°

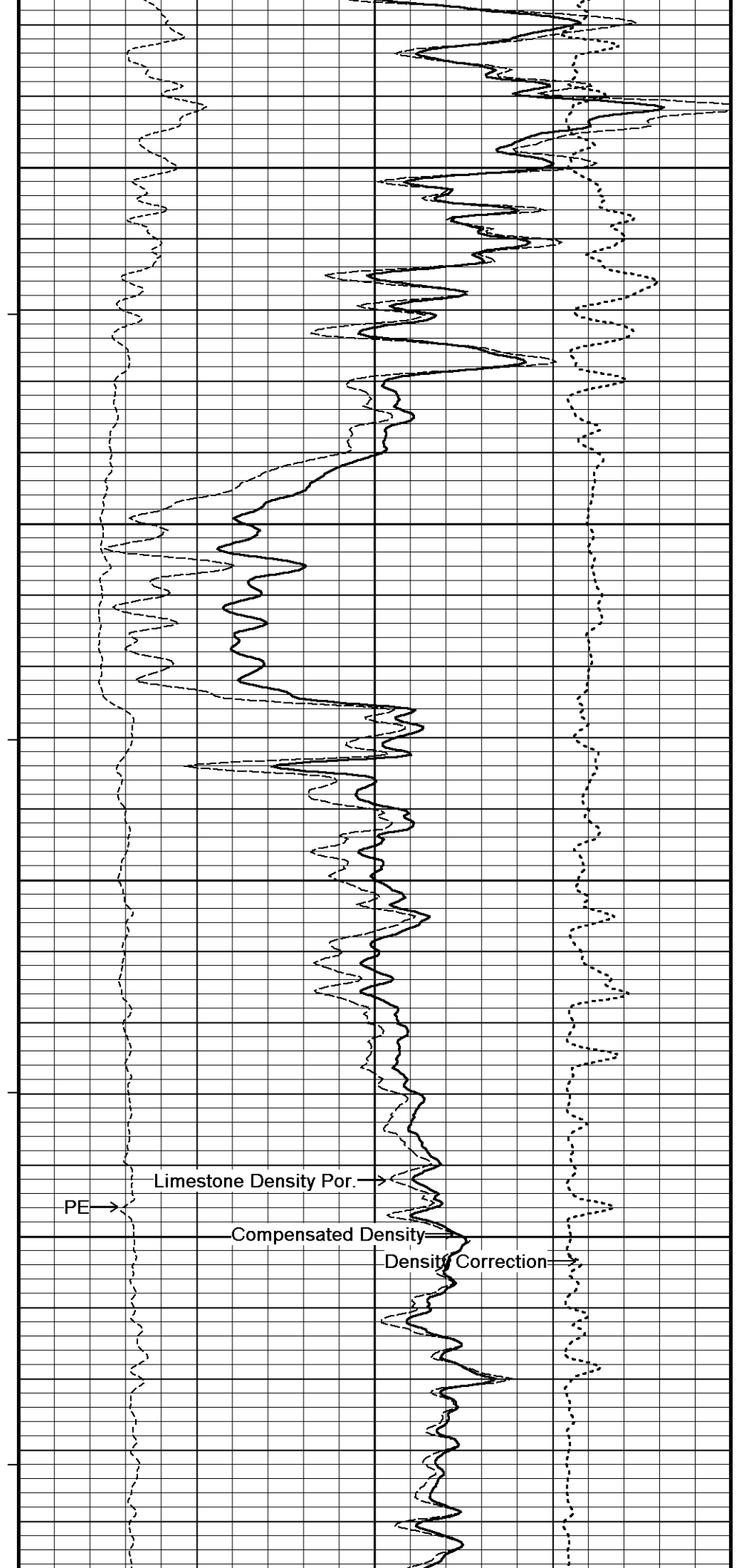
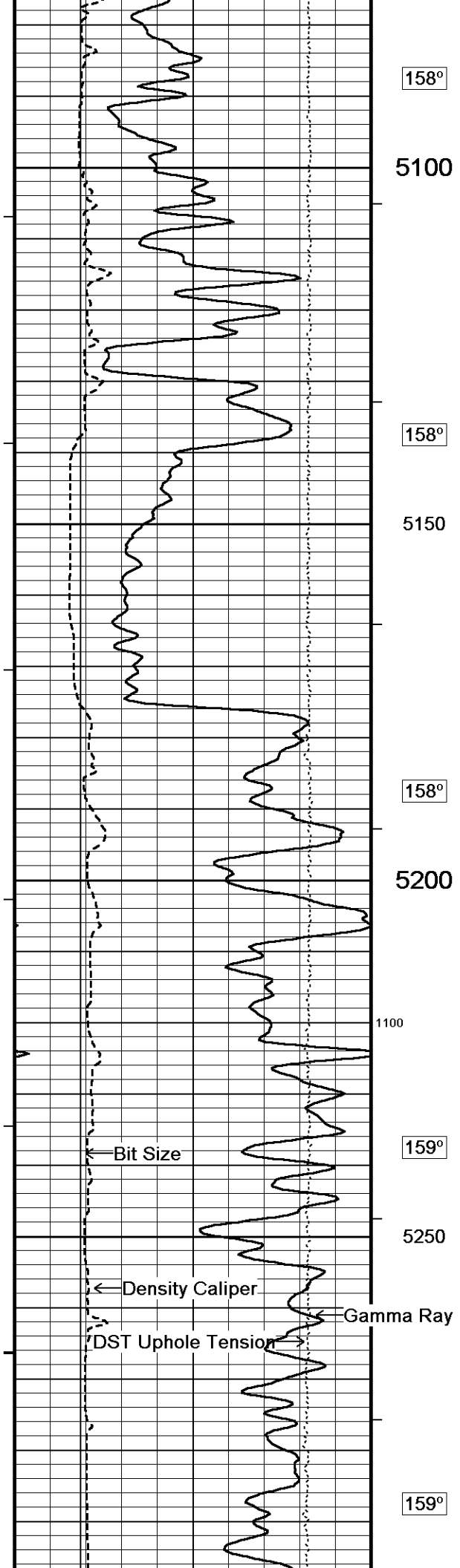


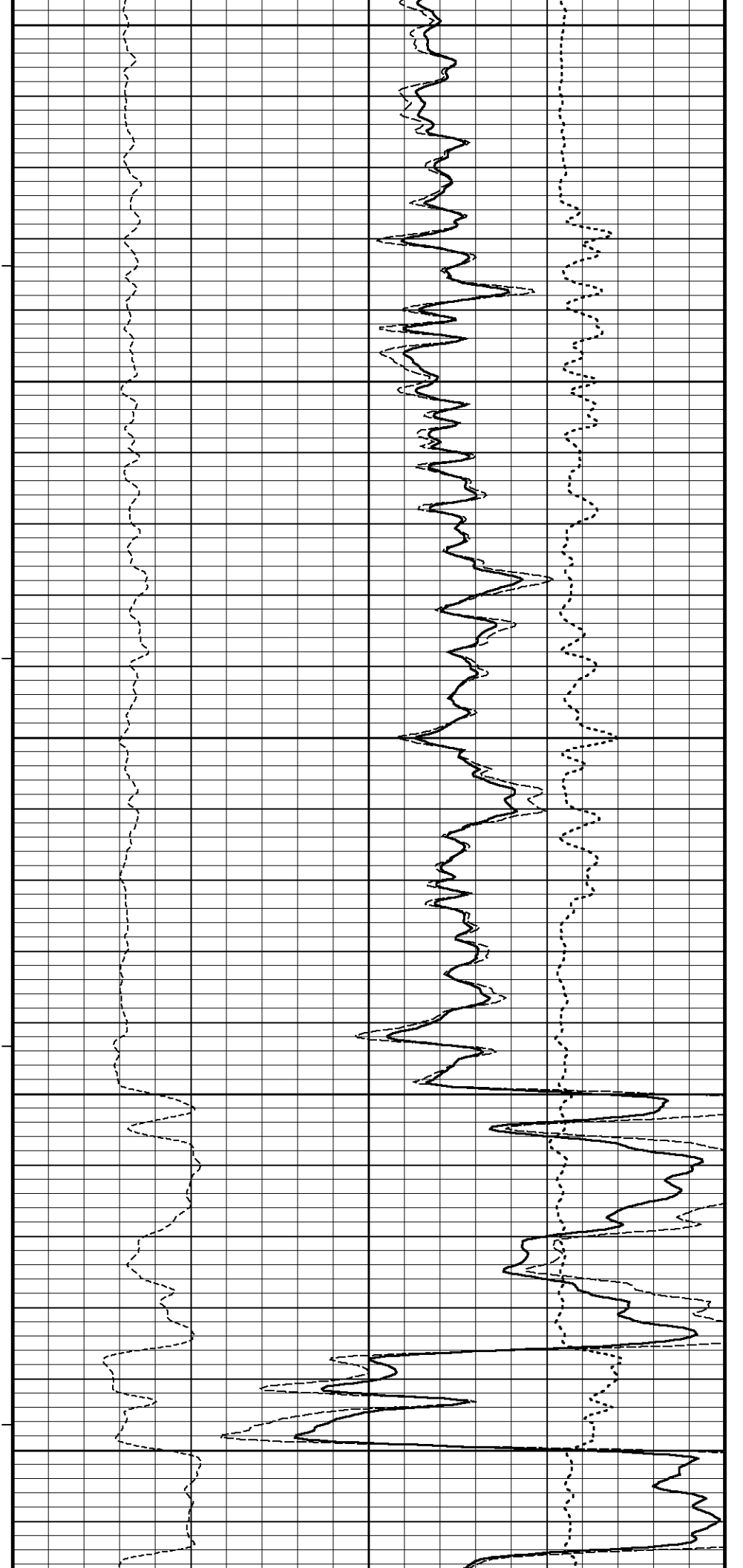
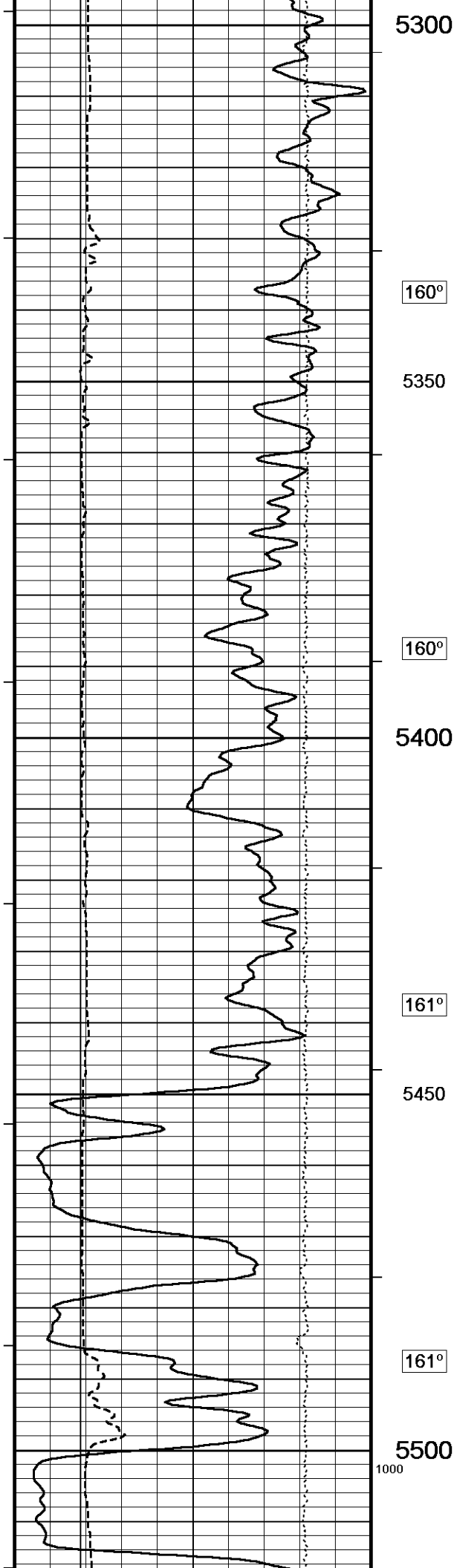


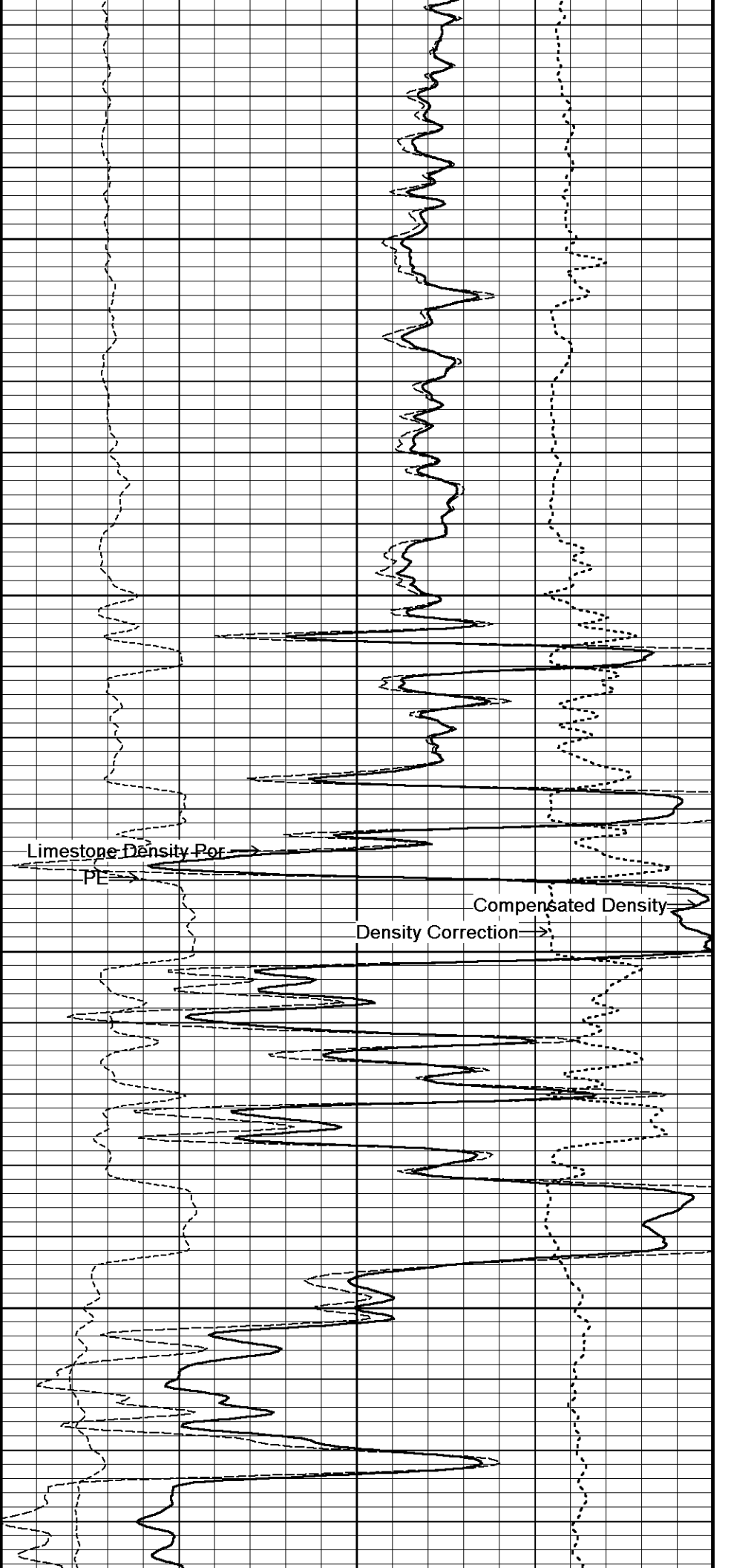
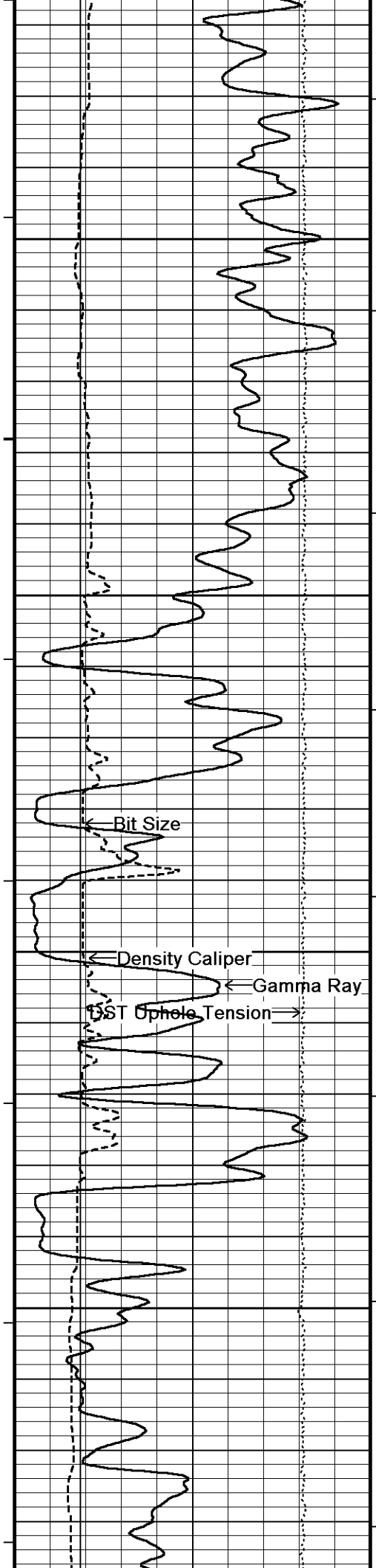


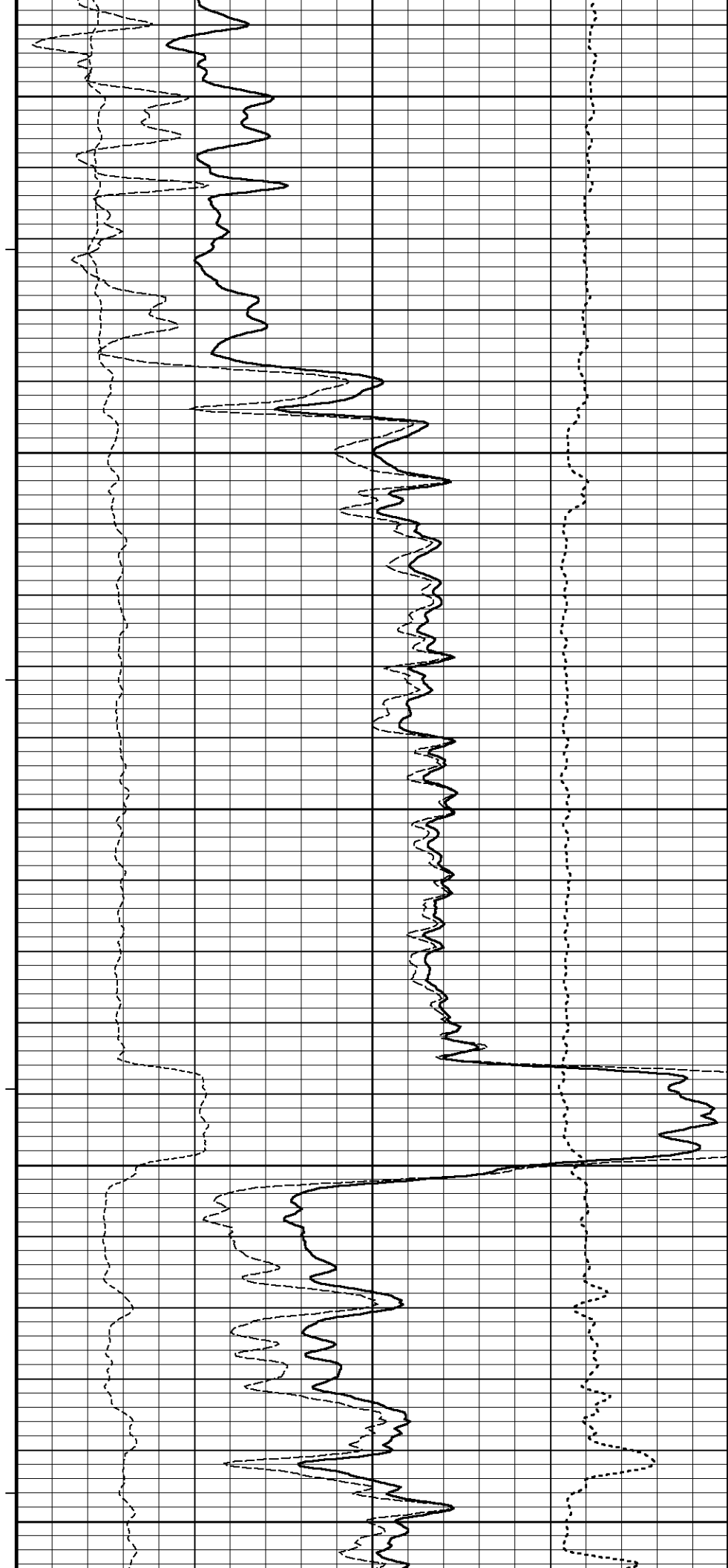
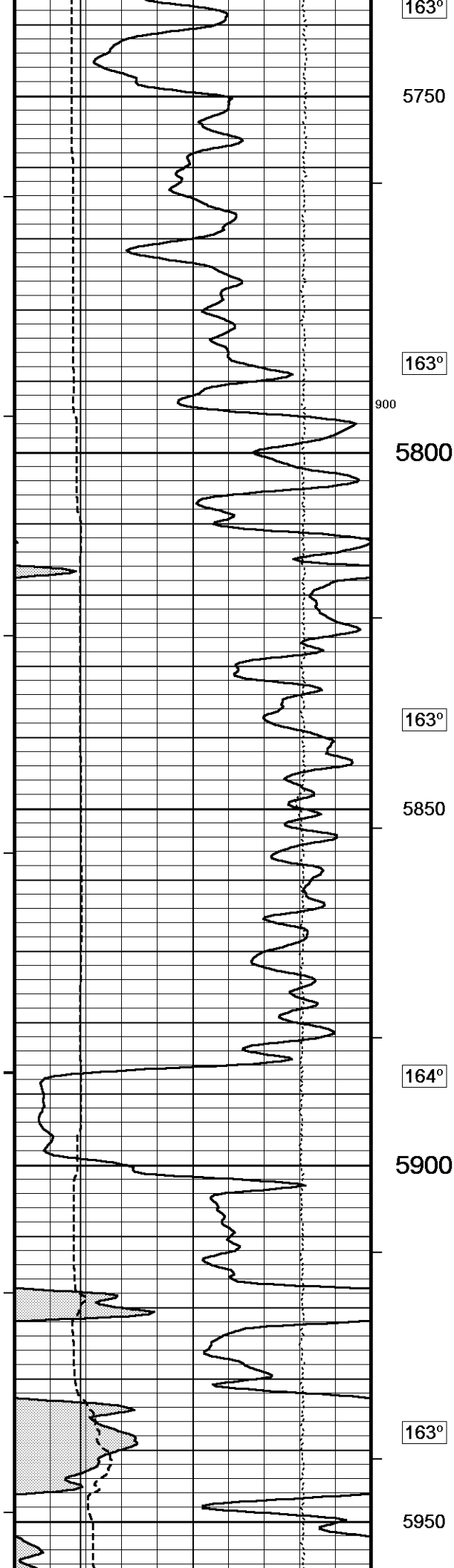


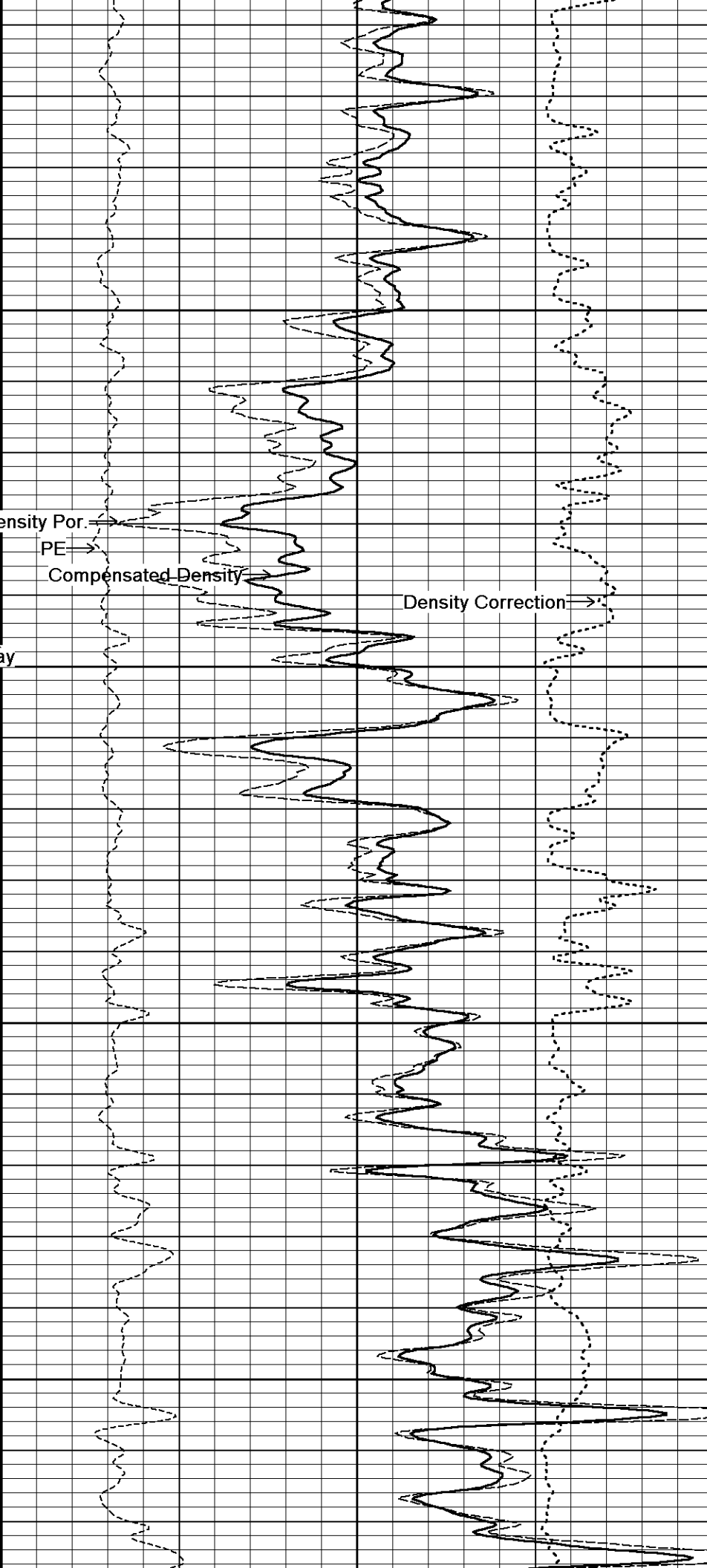
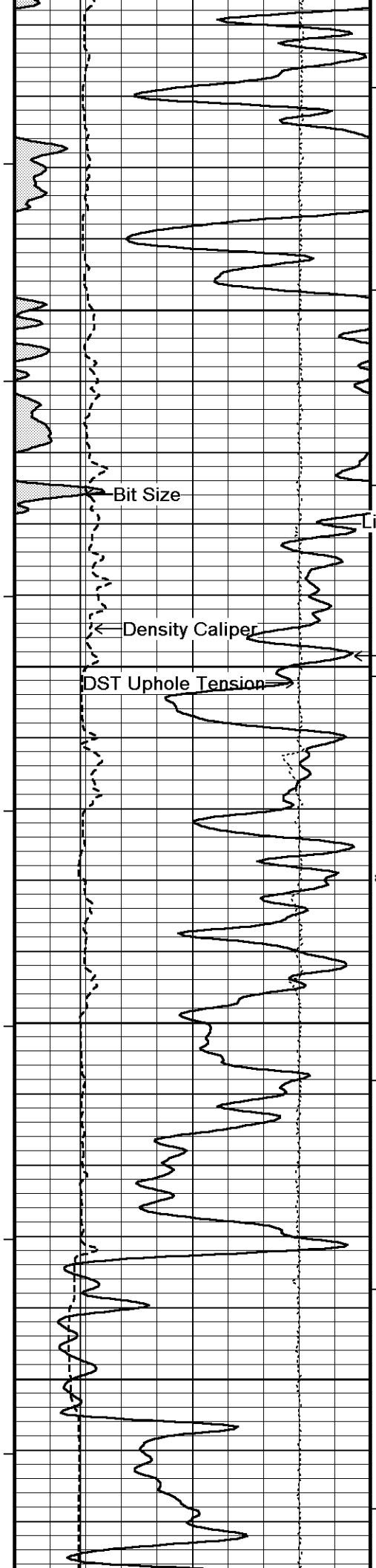












164°

6000

Bit Size

Limestone Density Por.

PE

164°

Compensated Density

Density Correction

Density Caliper

DST Uphole Tension

Gamma Ray

165°

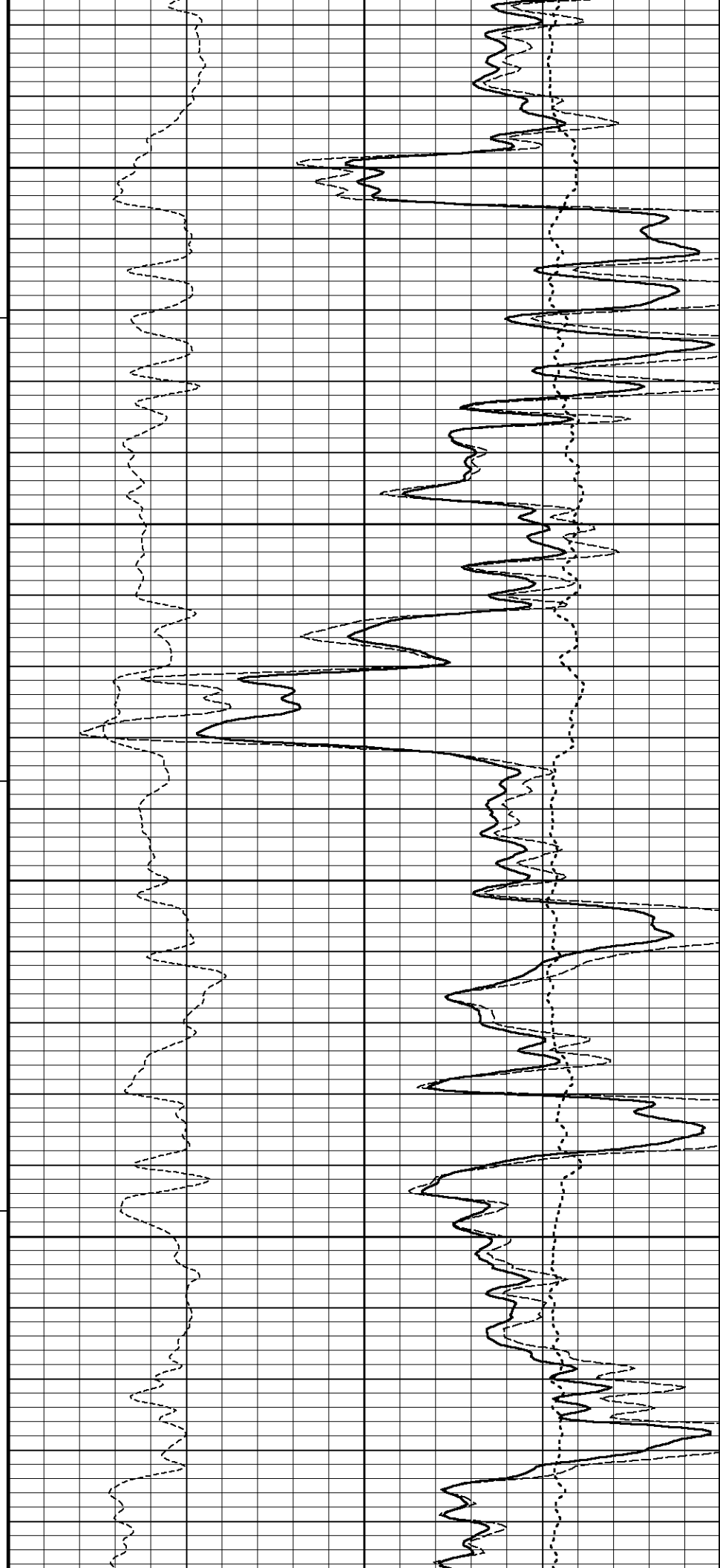
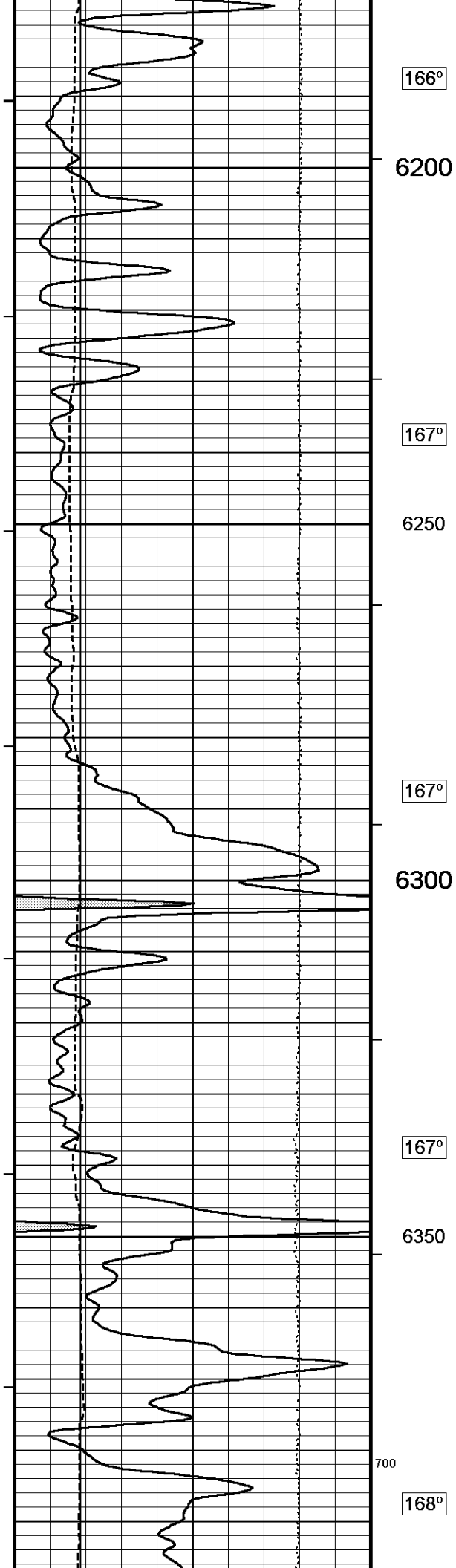
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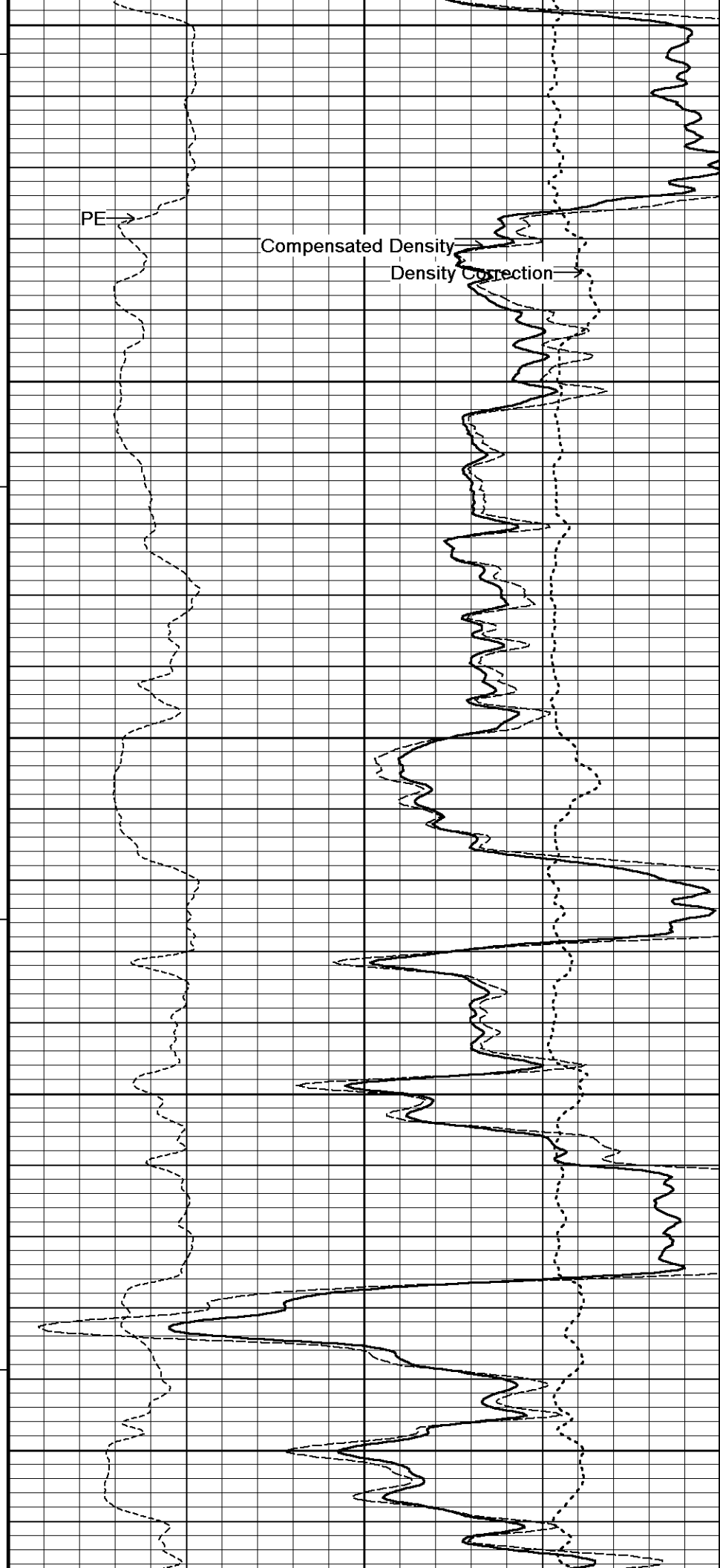
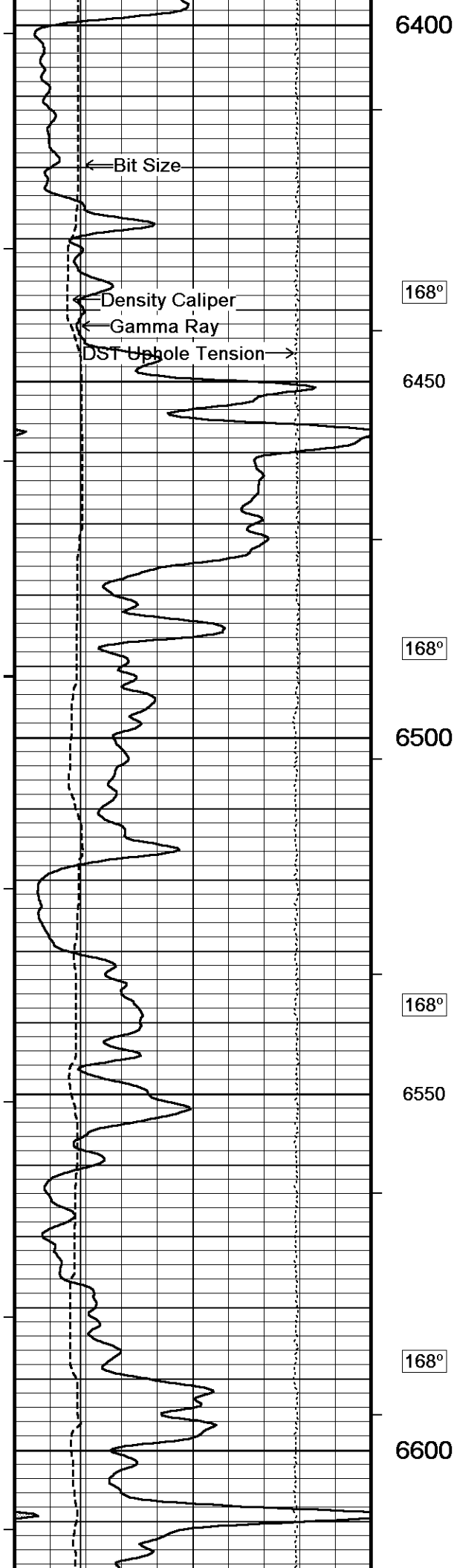
165°

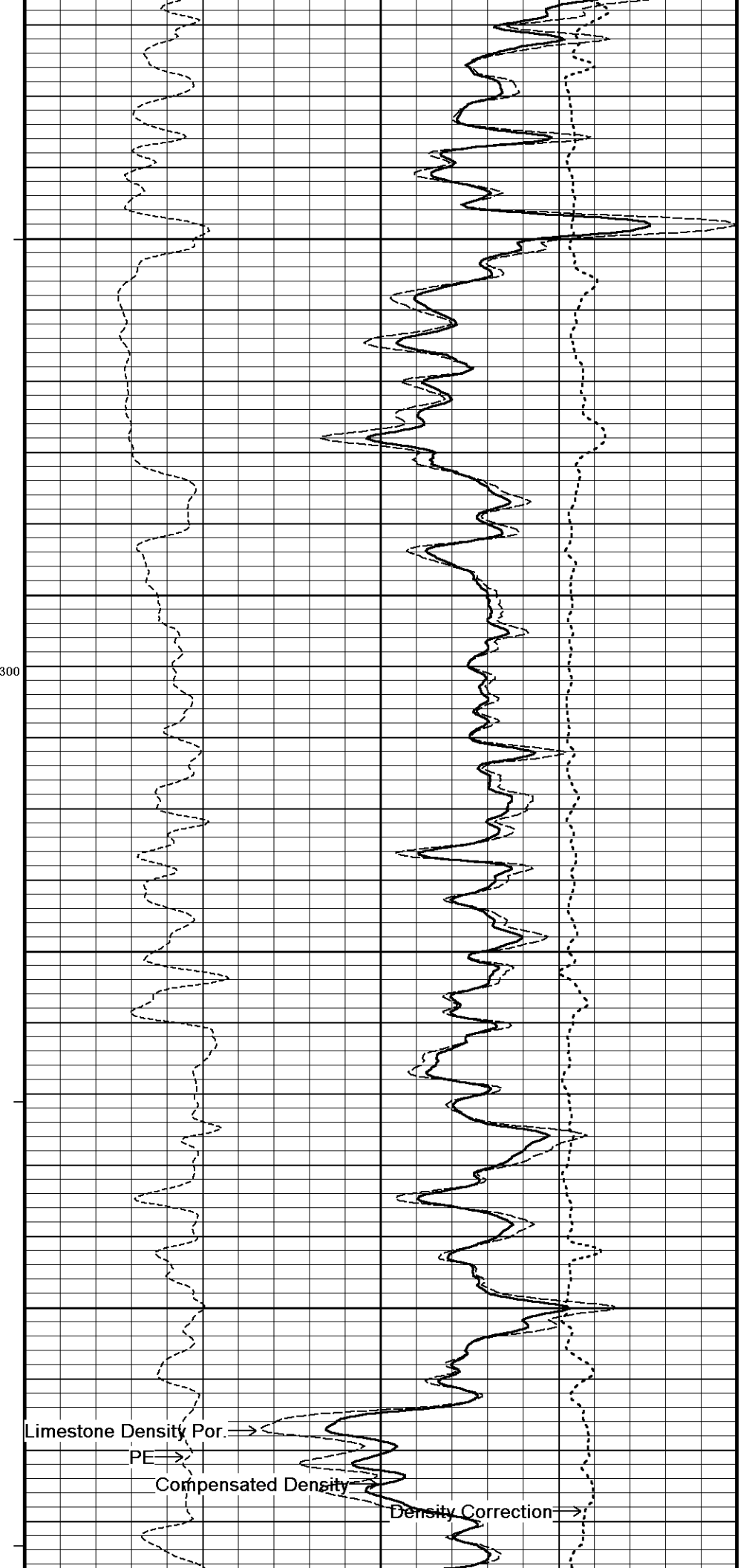
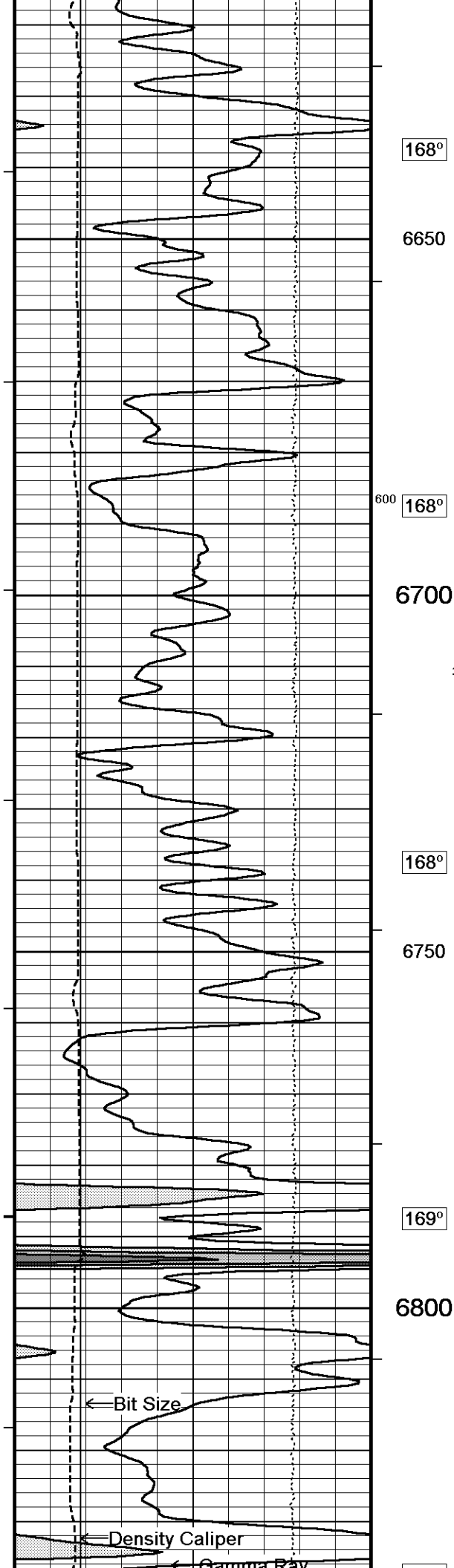
6100

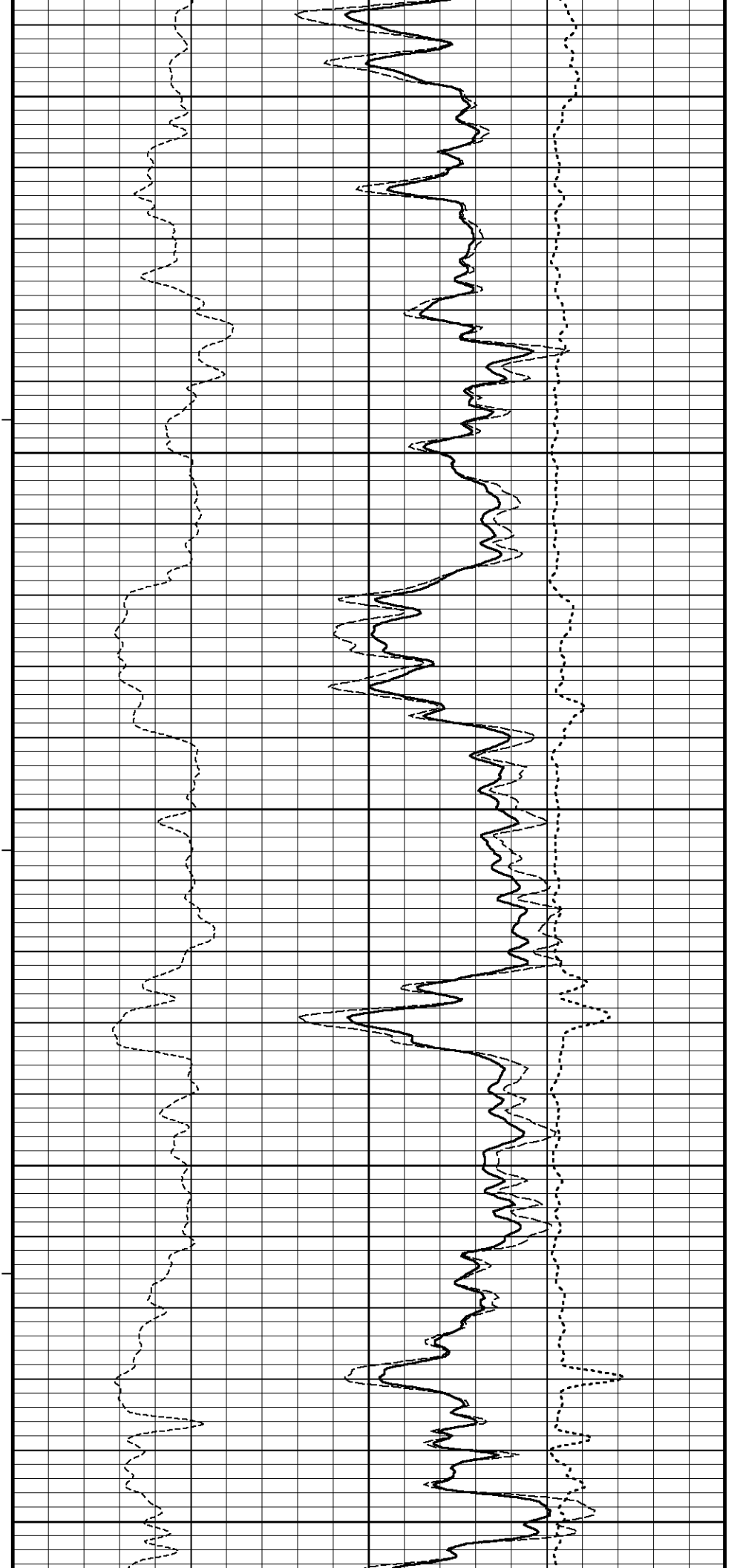
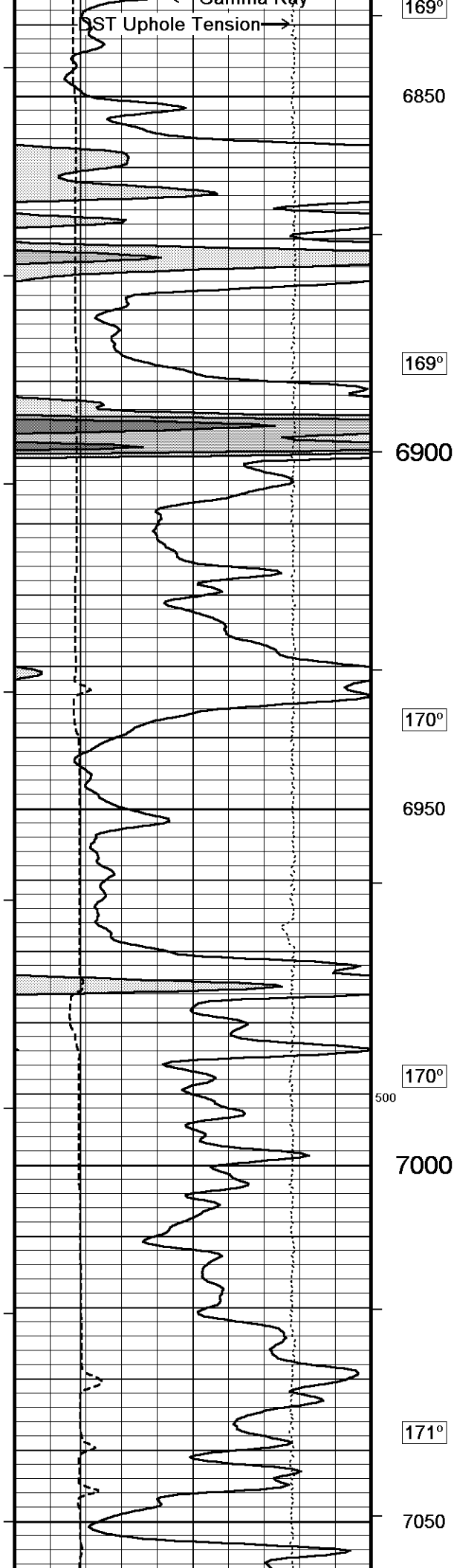
166°

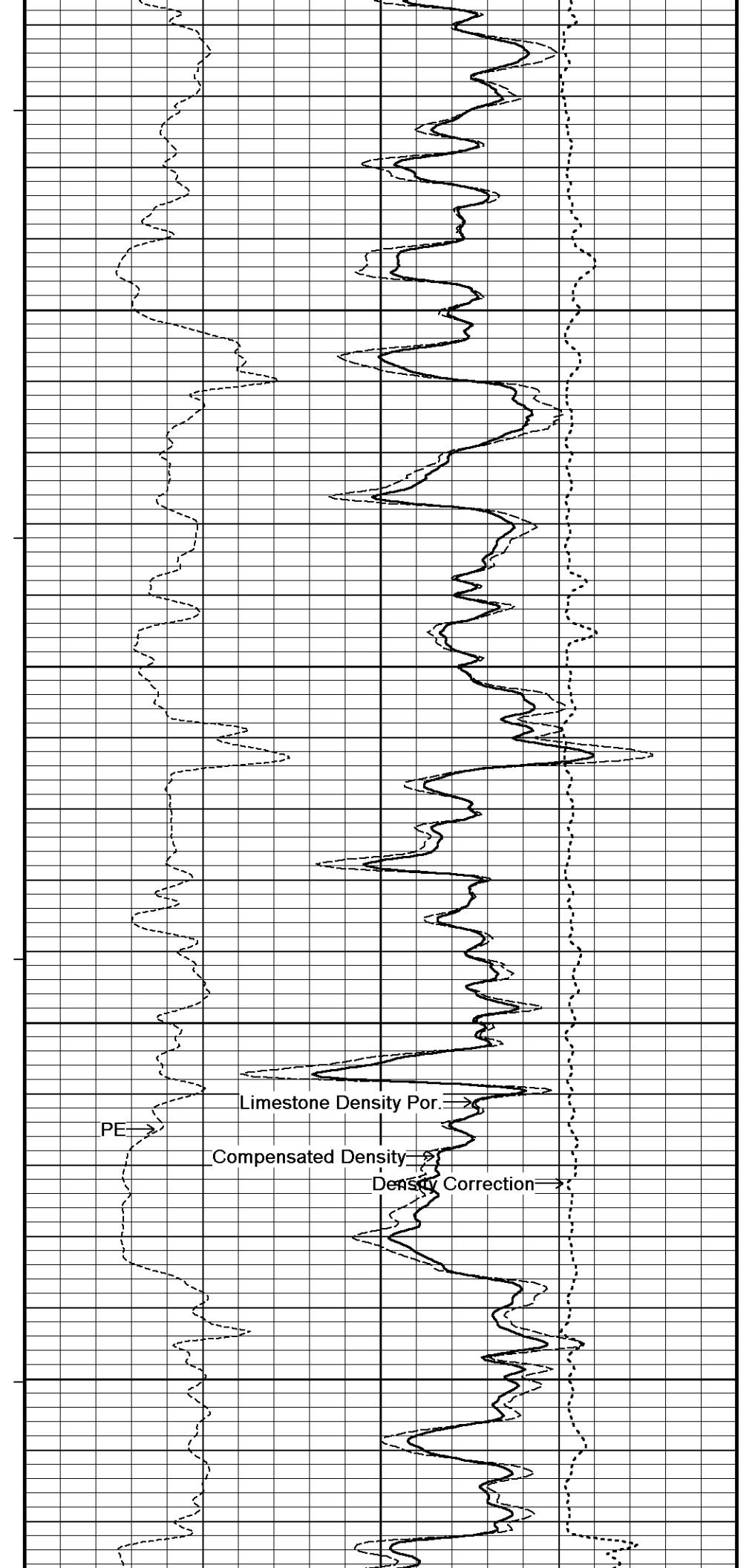
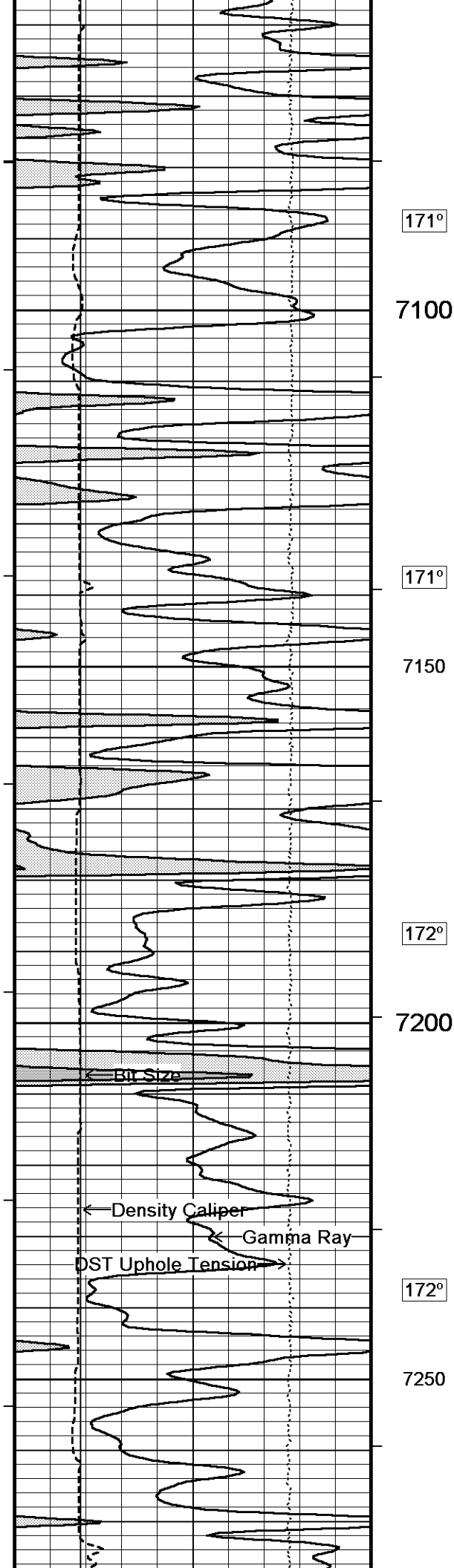
6150

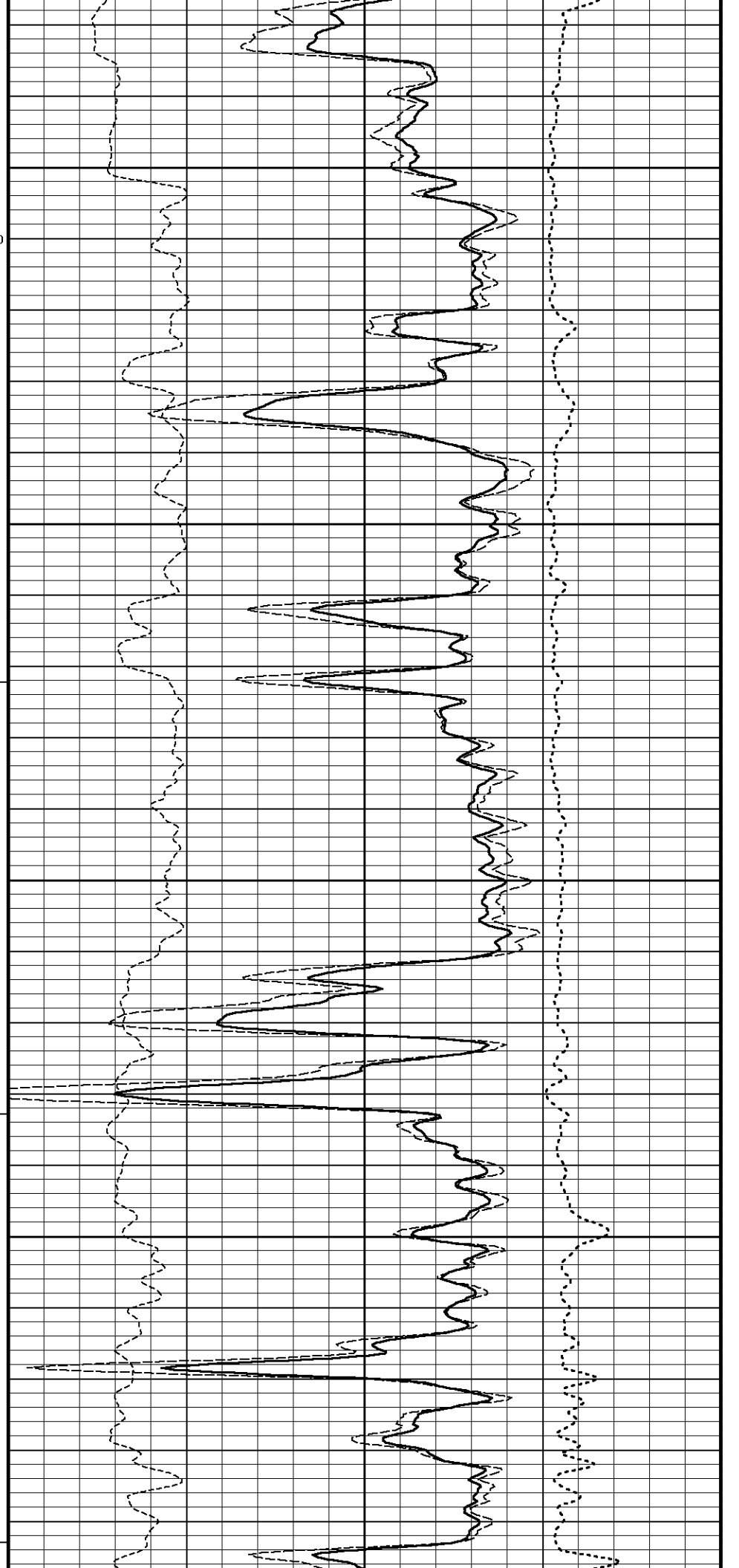
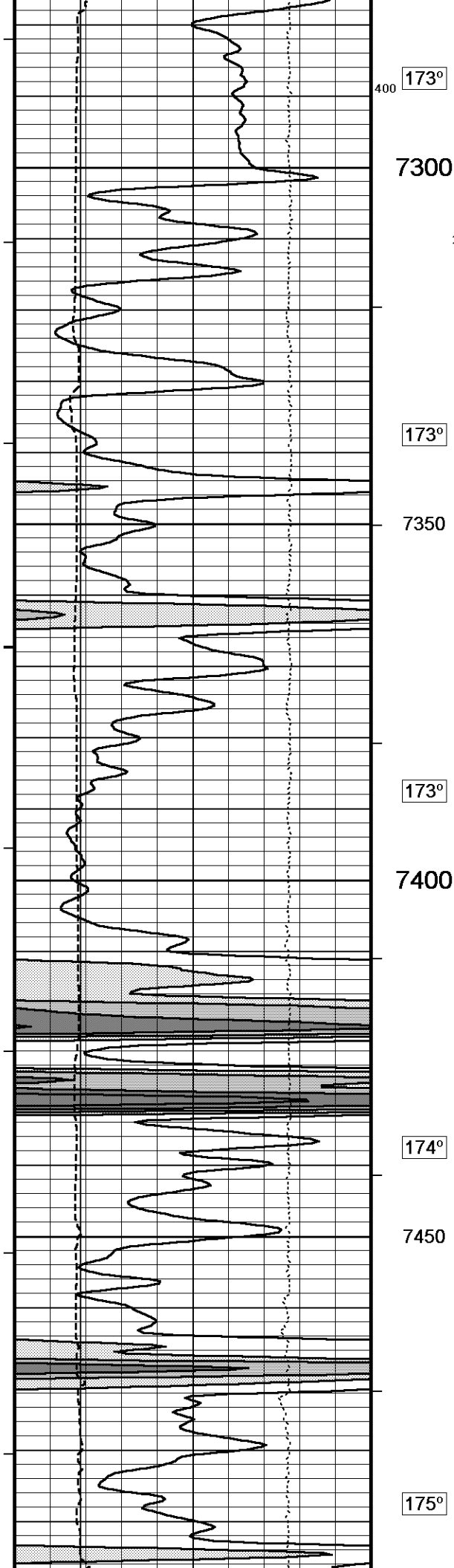


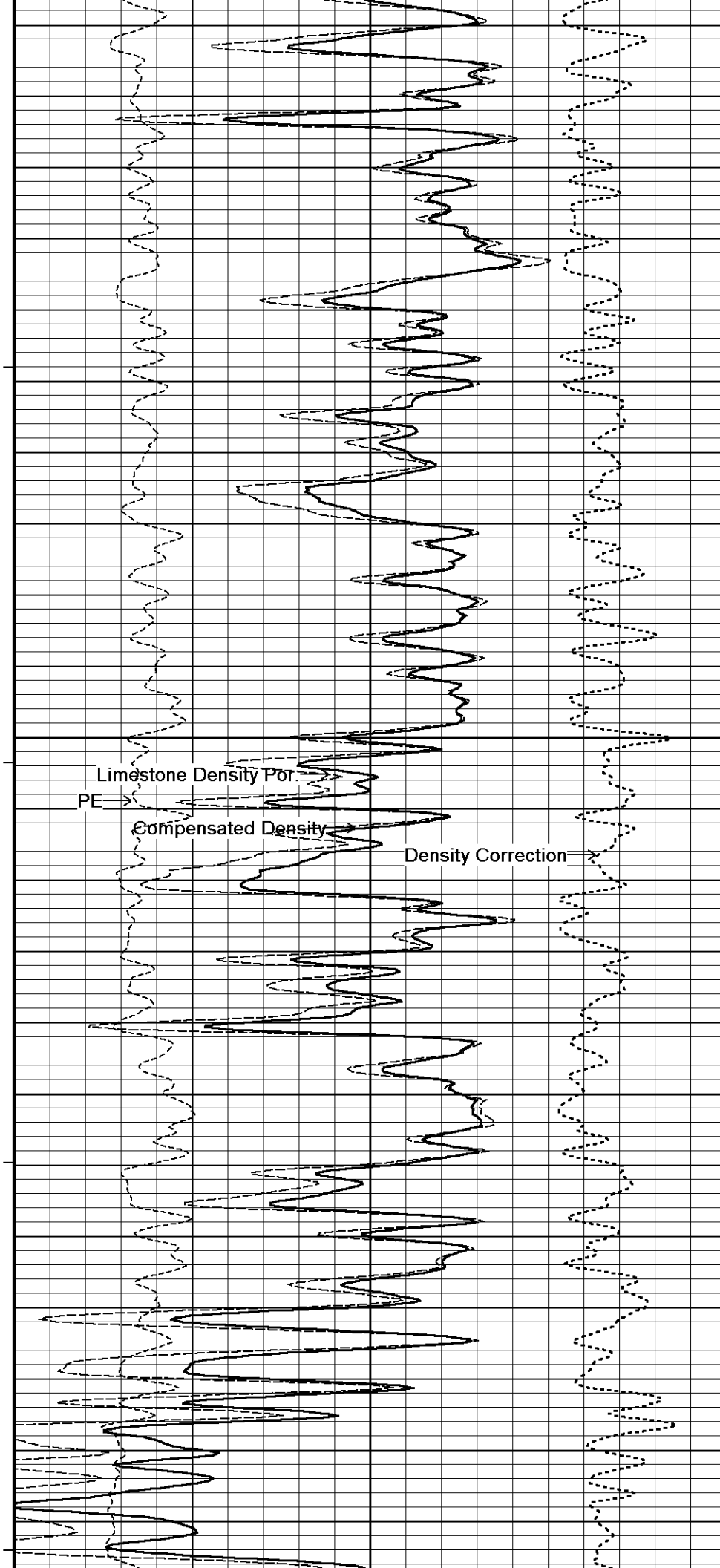
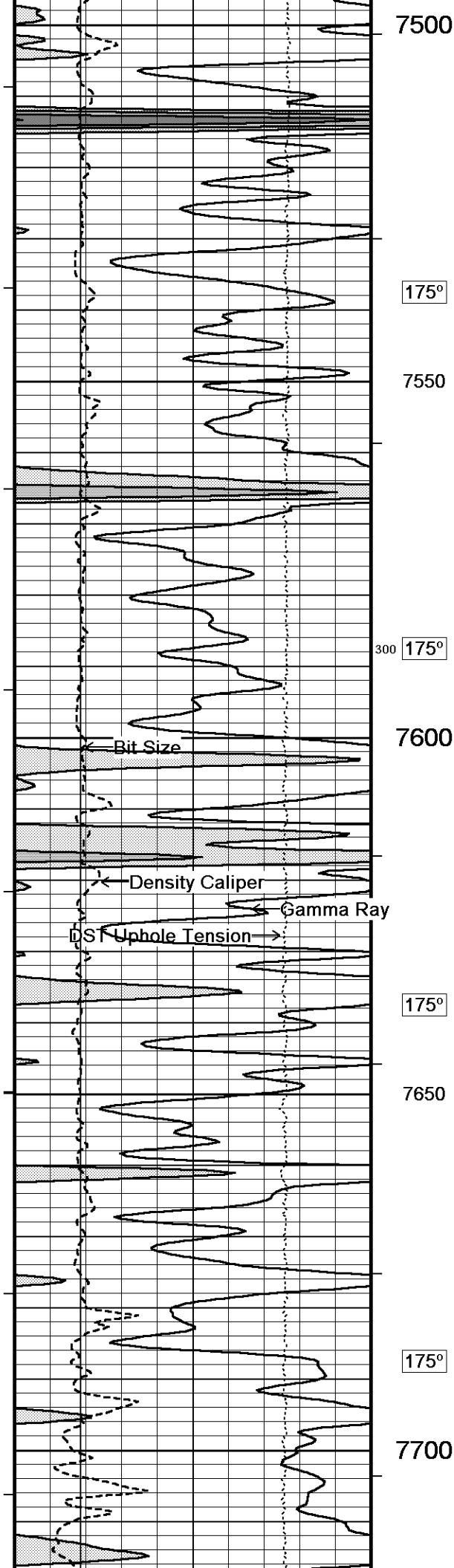


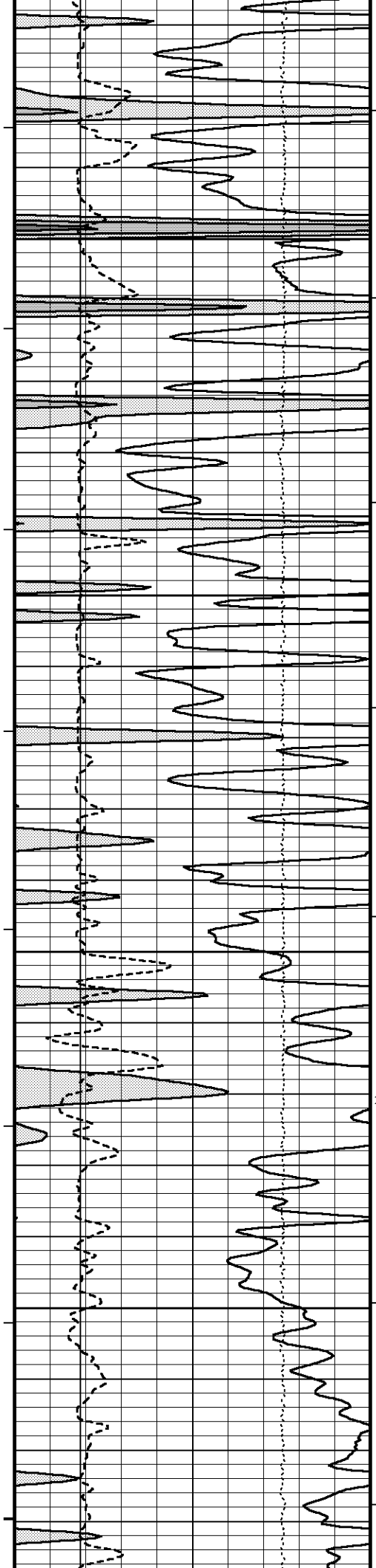












176°

7750

177°

7800

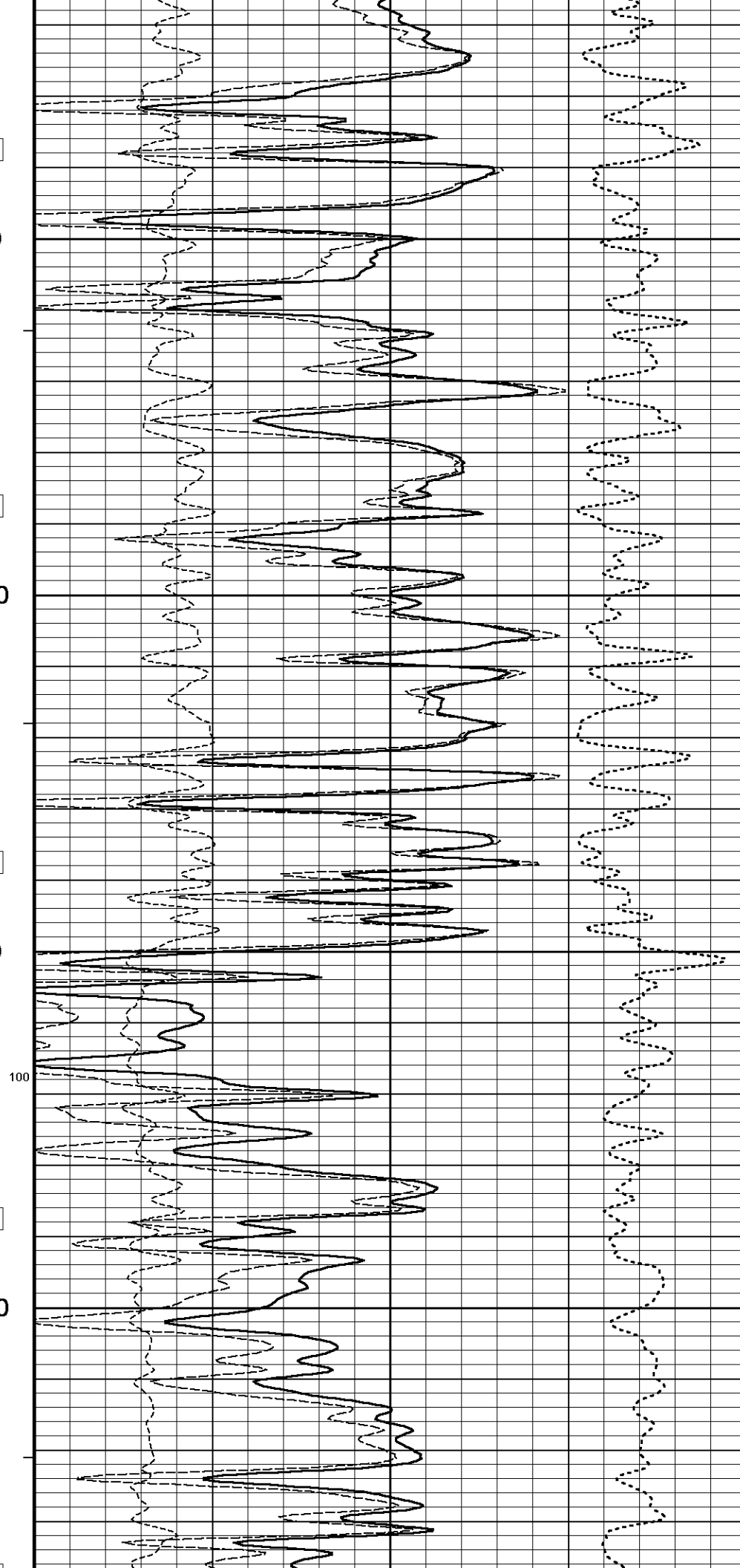
178°

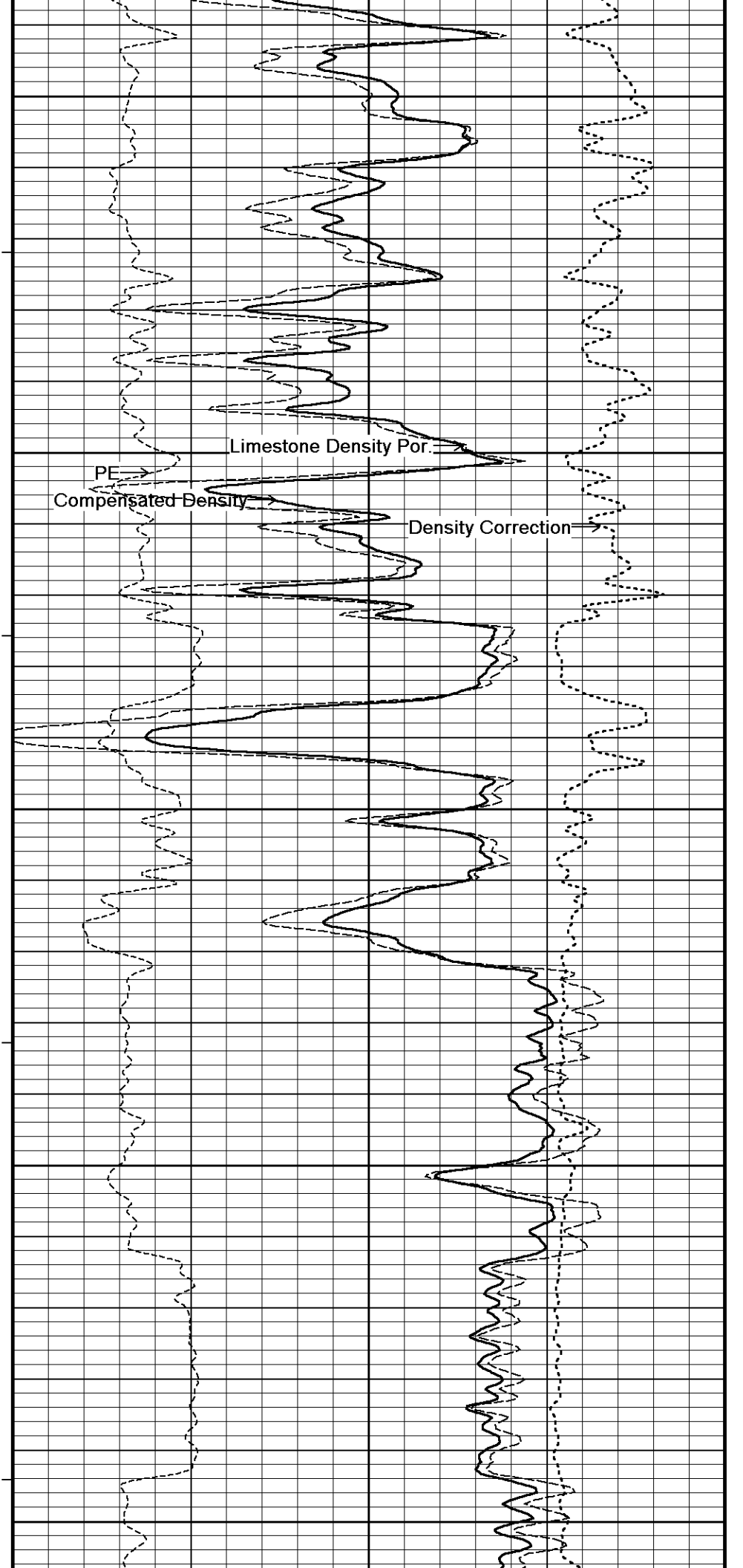
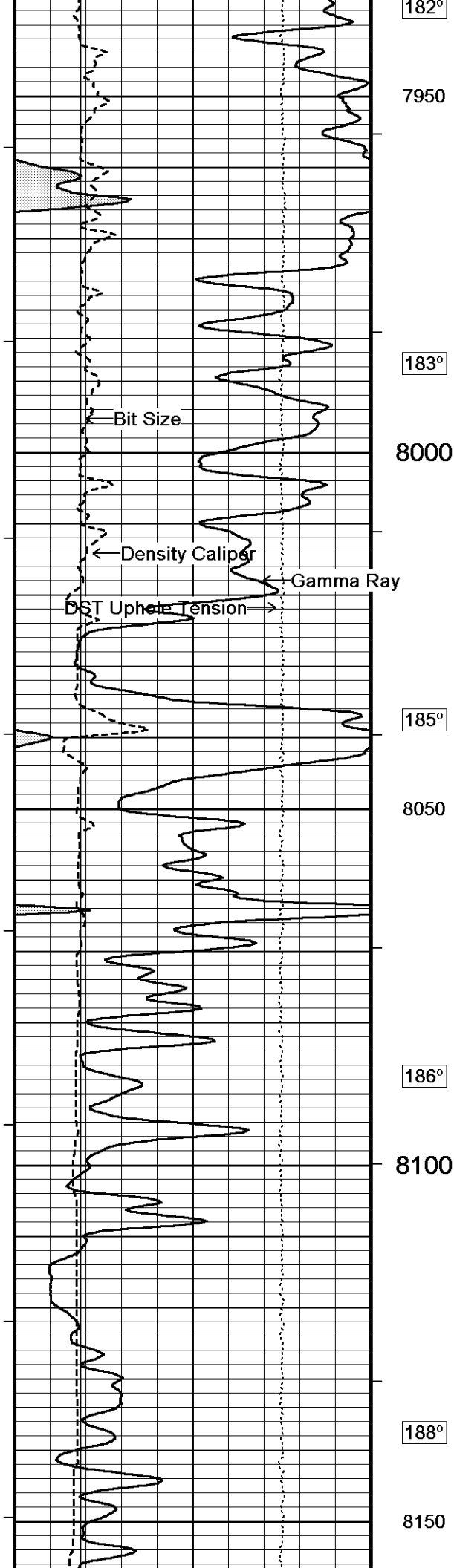
7850

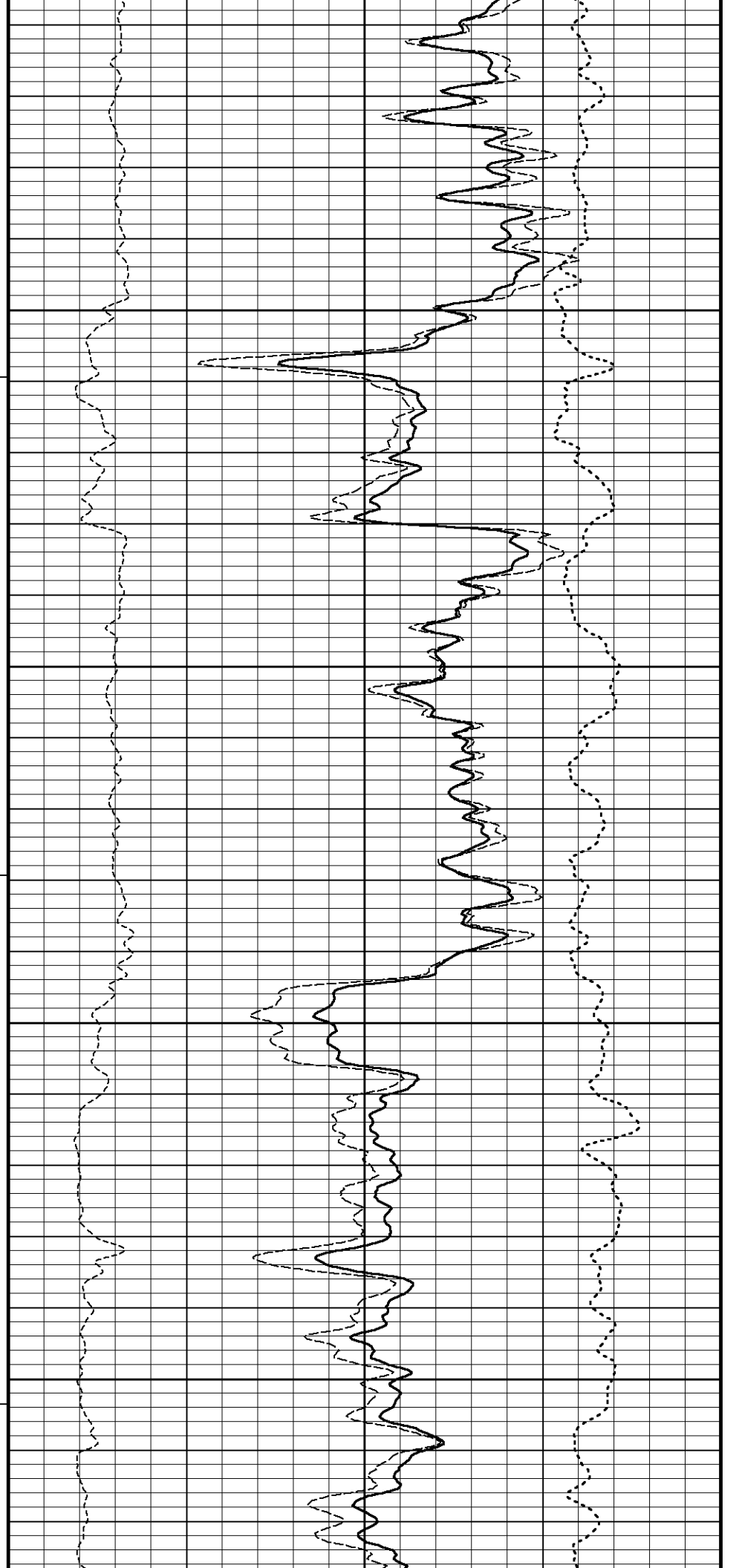
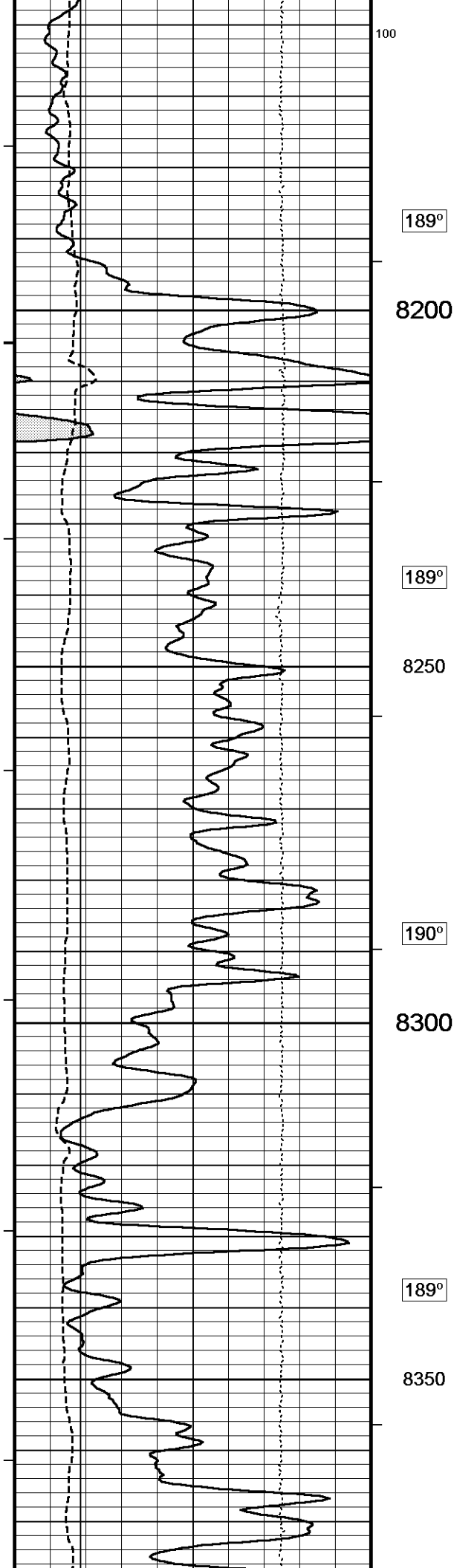
200

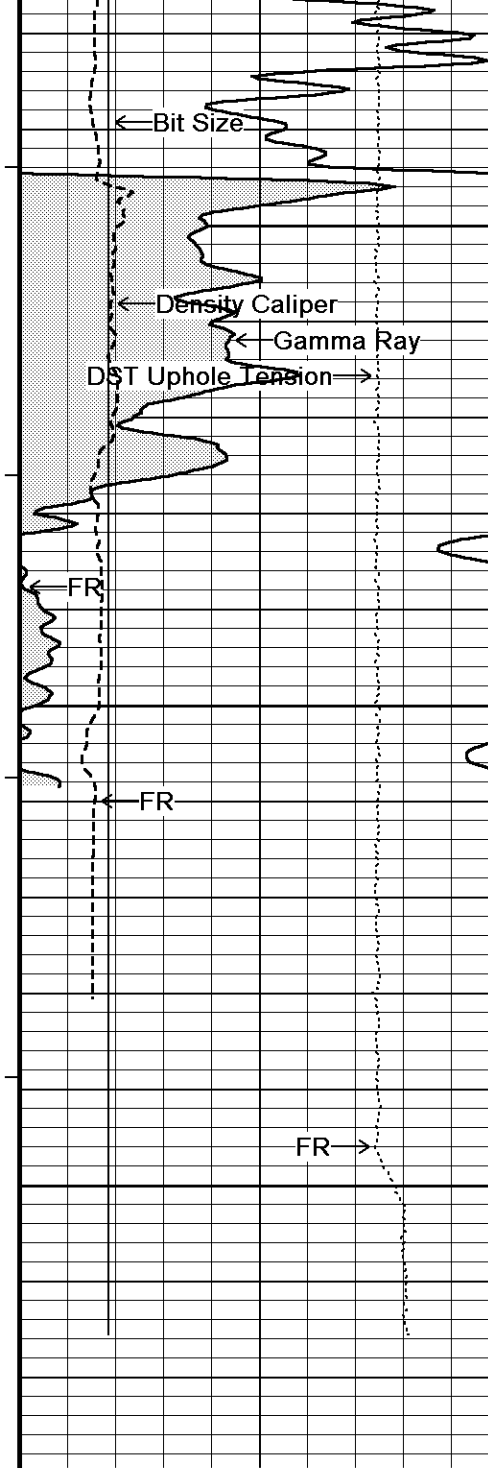
180°

7900

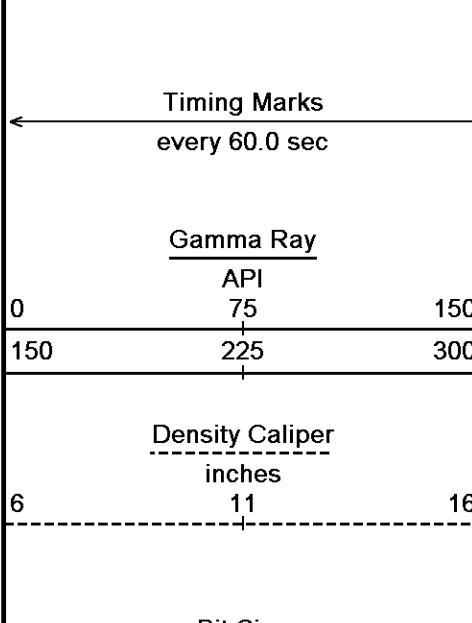
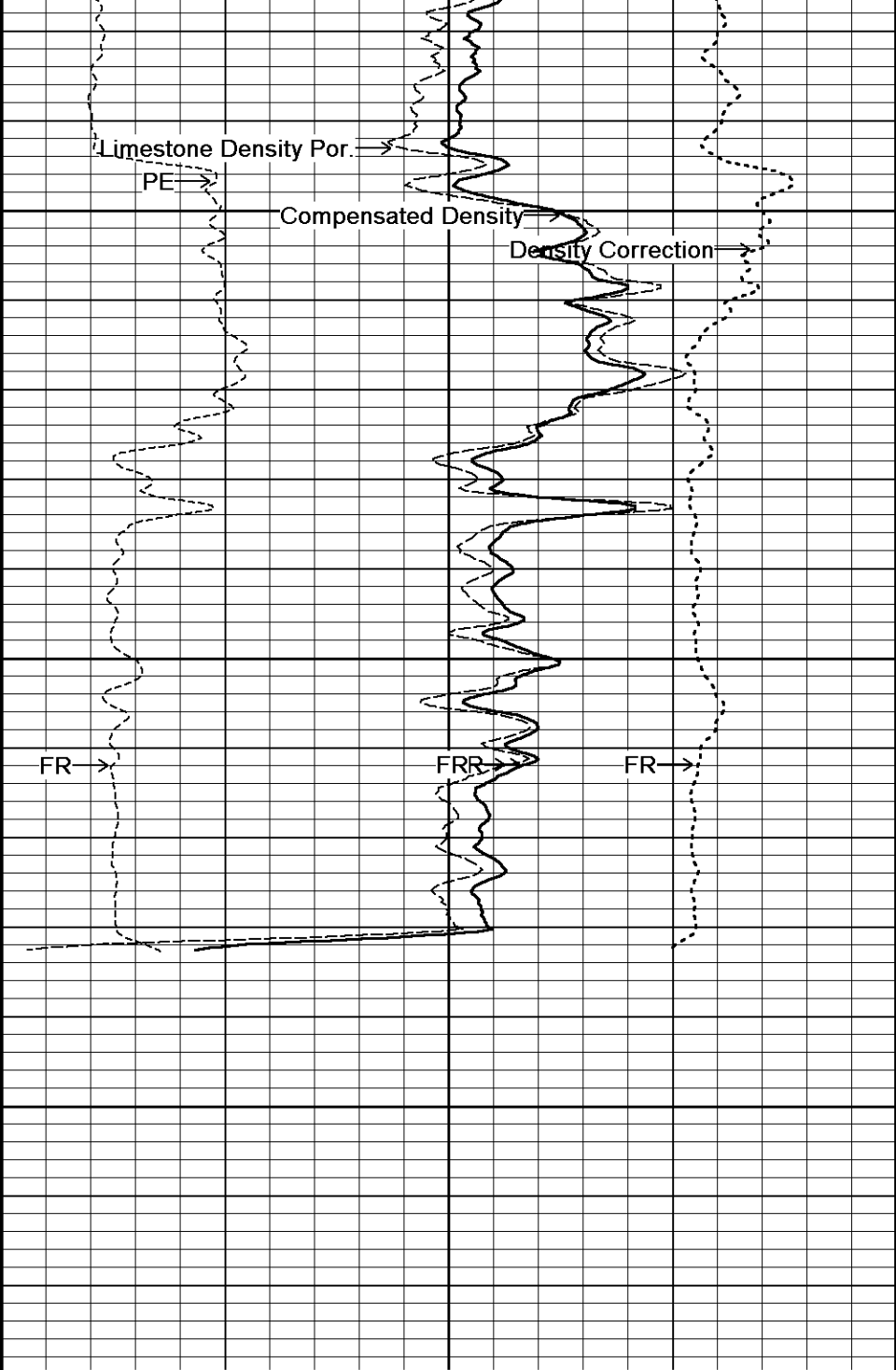








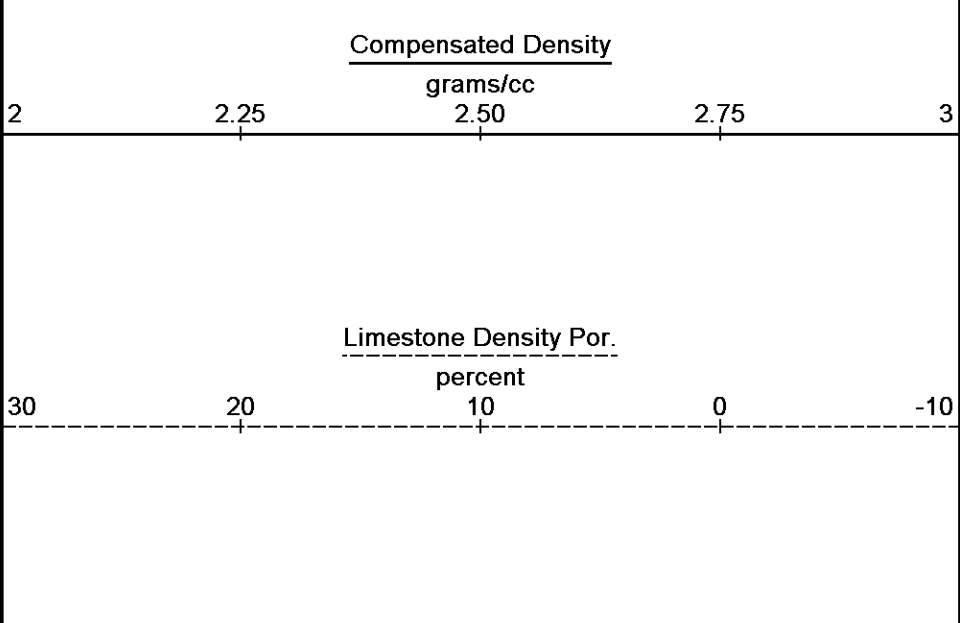
189°
8400
189°
8450
0
TD
8500

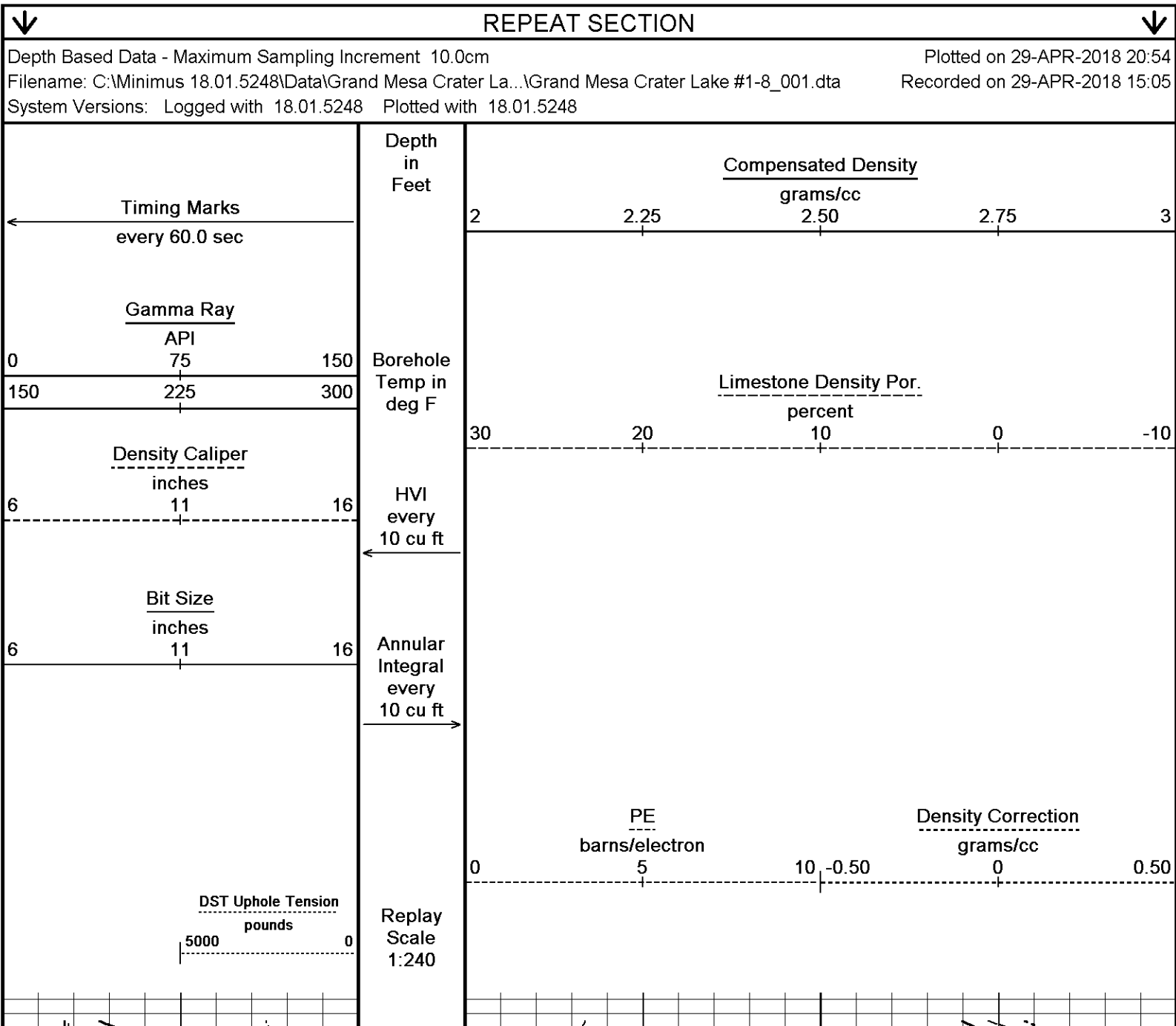
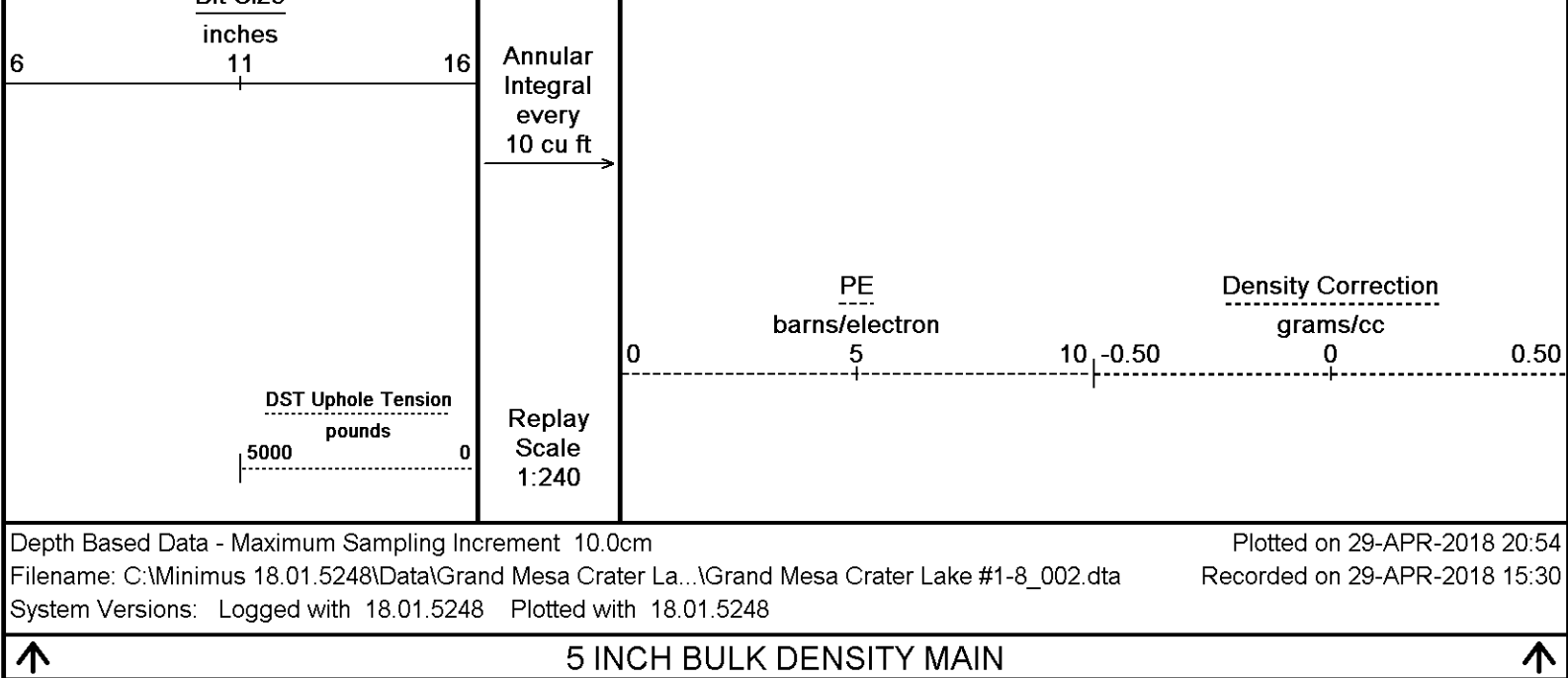


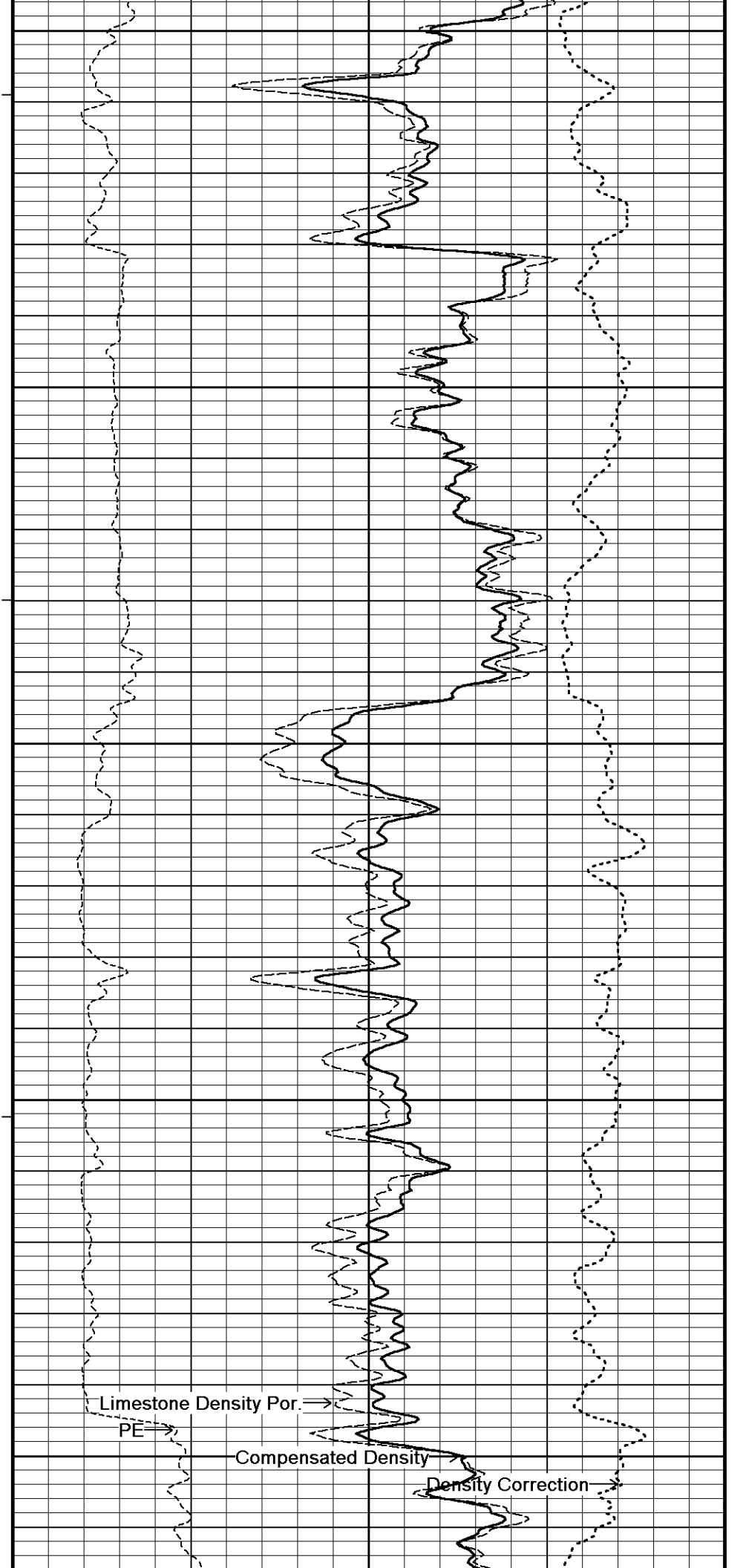
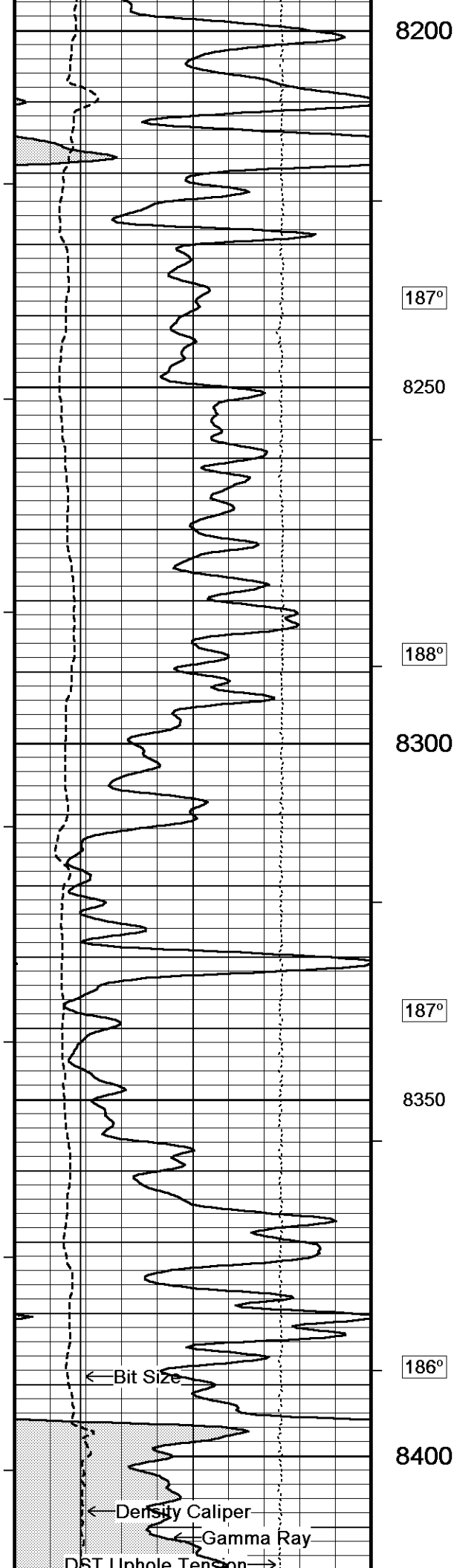
Depth
In
Feet

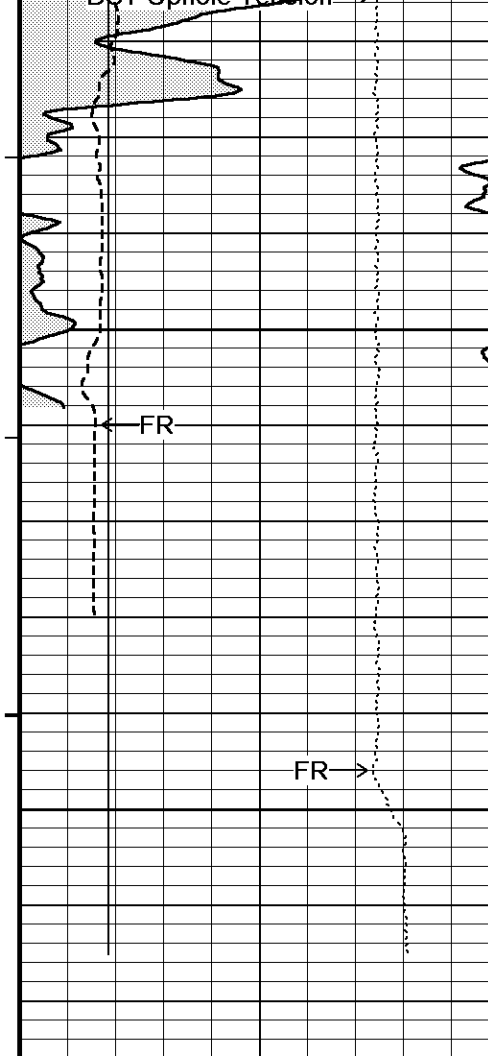
Borehole
Temp in
deg F

HVI
every
10 cu ft

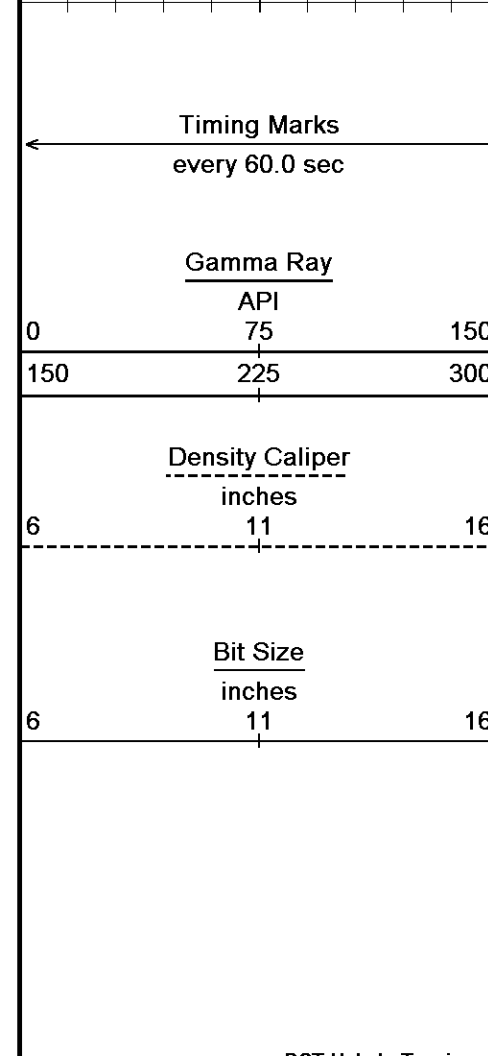
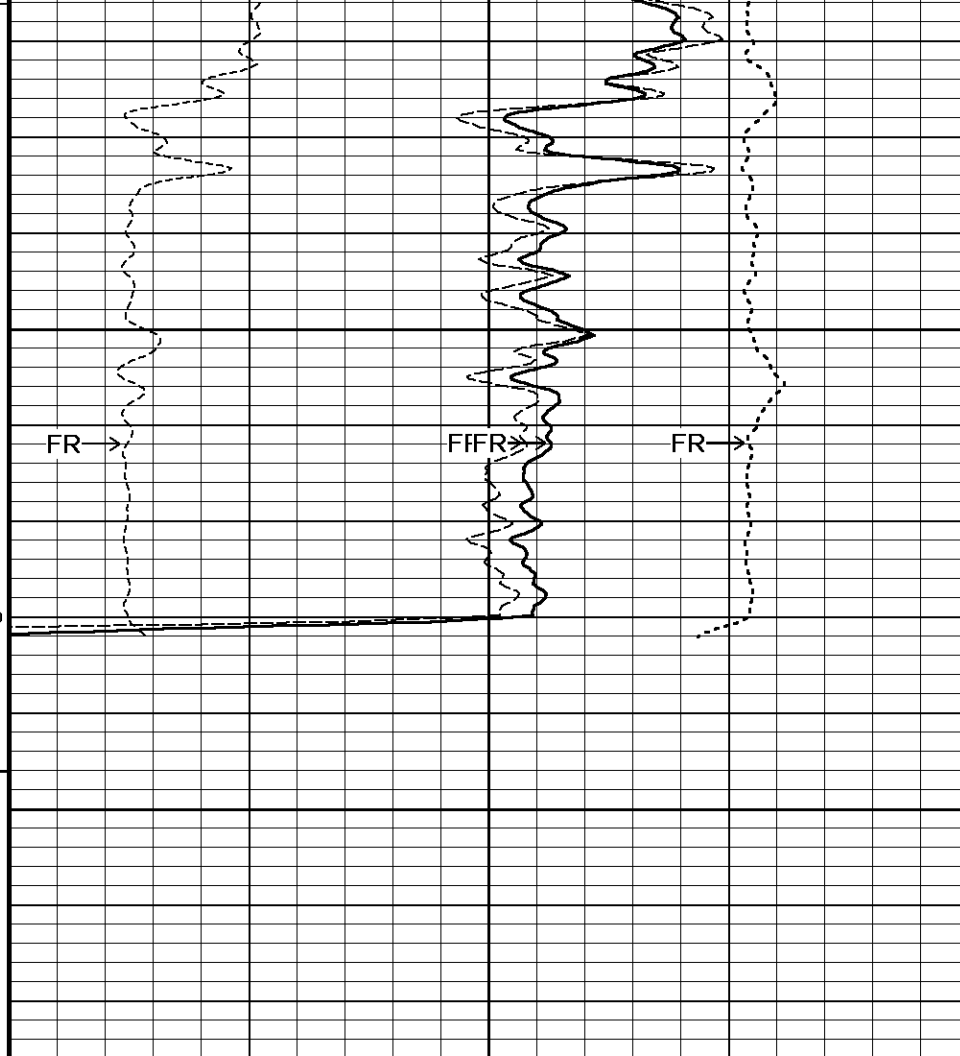




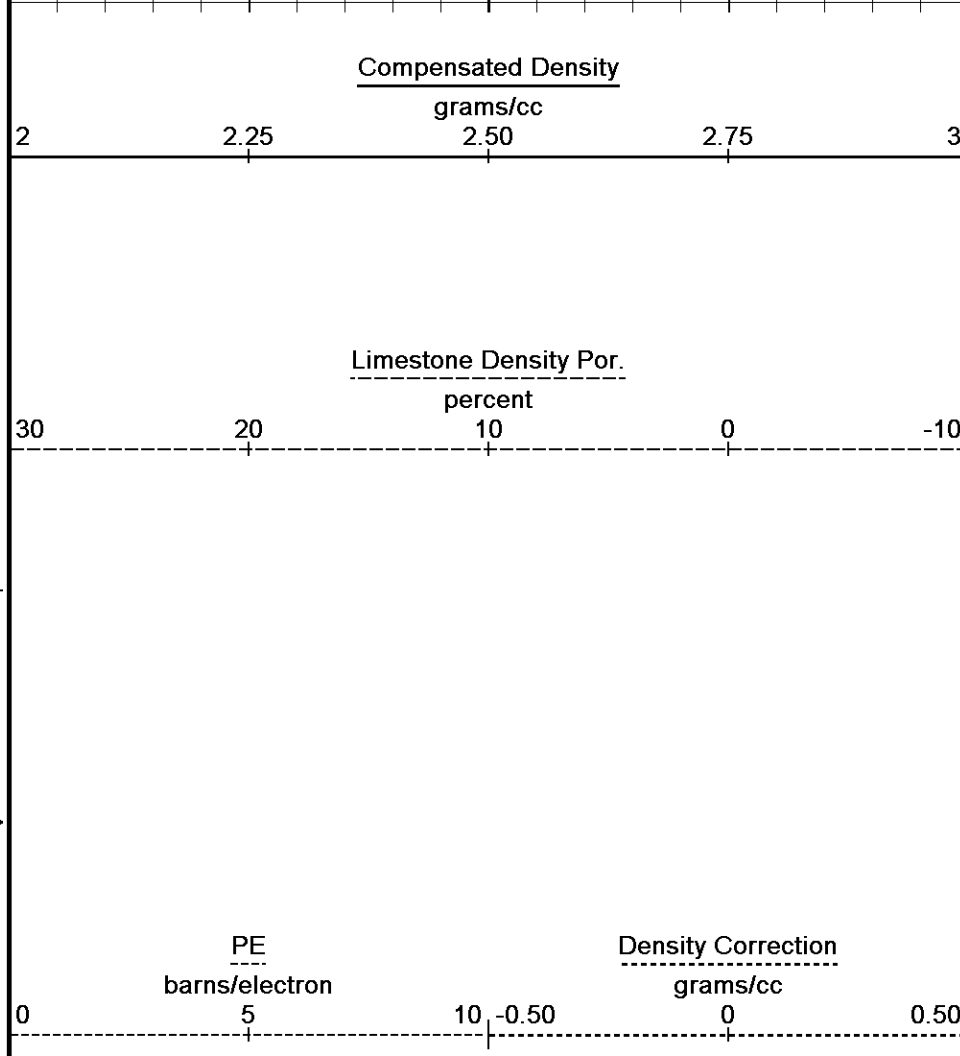




188°
8450
0
TD
8500



Depth in Feet
Borehole Temp in deg F
HVI every 10 cu ft
Annular Integral every 10 cu ft



BEFORE SURVEY CALIBRATION

C:\Minimus 18.01.5248\Data\Grand Mesa Crater Lake #1-8\Grand Mesa Crater Lake #1-8_001.dta

General Constants All 000

Last Edited on 29-APR-2018,14:19

General Parameters

Mud Resistivity0.940ohm-metres

Mud Resistivity Temperature75.000degrees F

Water Level0.000feet

Borehole Fluid ProcessingWet Hole

Hole/Annular Volume and Differential Caliper Parameters

HVOL MethodSingle Caliper

HVOL Caliper 1Density Caliper

HVOL Caliper 2N/A

Annular Volume Diameter5.500inches

Caliper for Differential CaliperNone

Rwa Parameters

Porosity usedCrossplot Porosity

Resistivity usedArray Ind. Two Res Rt

RWA Constant A0.620

RWA Constant M2.150

SW/APOR Tool Source0.000

Gamma Calibration MCG-D.J 422

Field Calibration on 29-APR-2018 05:25

MeasuredCalibrated (API)

Background9063

Calibrator (Gross)742519

Calibrator (Net)653456

Gamma Calibration Tolerances MCG-D.J 422

Ratio1.431

1.401.4751.55

Counts/API

Gamma Constants MCG-D.J 422

Last Edited on 29-APR-2018,12:43

Gamma Calibrator NumberMCGGRCC141

GRC-M Calibrator Jig in Use?NO

Inactive Background Jig in Use?NO

Mud Density1.13gm/cc

Caliper Source for ProcessingDensity Caliper

Tool PositionEccentred

Potassium EquivalenceChloride

K Mud Concentration0.00%

High Resolution Temperature Calibration MCG-D.J 422

Field Calibration on 13-APR-2018,06:34

MeasuredCalibrated(Deg F)

Lower50.0050.00

Upper212.00212.00

High Resolution Temperature Constants MCG-D.J 422

Last Edited on 07-DEC-2017,17:17

Pre-filter Length11

Caliper Calibration MPD-C.A 216

Base Calibration on 06-APR-2018 10:55

Field Calibration on 29-APR-2018 05:40

Base Calibration

Reading NoMeasuredCalibrator Size (in)

1	13889	3.99
2	22592	5.98
3	31350	7.97
4	39584	9.86
5	48879	11.92
6	N/A	N/A

Field Calibration

Measured Caliper (in)	Actual Caliper (in)
7.99	7.97

Caliper Calibration Tolerances MPD-C.A 216

Long Arm Field Cal.	7.99	<div><div></div><div></div><div></div></div>	in
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Photo Density Calibration MPD-C.A 216

Base Calibration on 06-APR-2018 11:13

Field Check on 29-APR-2018 05:45

Density Calibration

Base Calibration	Measured		Calibrated (sdu)	
	Near	Far	Near	Far
Background	1011	1199		
Reference 1	49188	23851	59556	30836
Reference 2	19522	2251	24941	2541

Field Check at Base

1010.9	1199.5
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Field Check

1012.1	1213.7
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PE Calibration

Base Calibration	WS	Measured		Calibrated Ratio
		WH	Ratio	
Background	185	910		
Reference 1	20854	49032	0.429	0.371
Reference 2	5685	19414	0.297	0.272

Field Check at Base

185.2	910.4
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Field Check

187.5	910.6
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Photo Density Calibration Tolerances MPD-C.A 216

Near Density Ratio	2.60	<div><div></div><div></div><div></div></div>
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Far Density Ratio	21.55	<div><div></div><div></div><div></div></div>
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PE Calibration	0.124	<div><div></div><div></div><div></div></div>
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Near Den. Field Check	1012.1	<div><div></div><div></div><div></div></div>
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Far Den. Field Check	1213.7	<div><div></div><div></div><div></div></div>
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PE WS Field Check	187.5	<div><div></div><div></div><div></div></div>
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PE WH Field Check	910.6	<div><div></div><div></div><div></div></div>
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Density Constants MPD-C.A 216

Last Edited on 29-APR-2018,12:43

Density Source Id	P50557B	
Nylon Calibrator Number	DNCE695	
Aluminium Calibrator Number	DACD698	
Density Shoe Profile	8 inch	
Caliper Source for Processing	Density Caliper	
PE Correction to Density	Not Applied	
Mud Density	1.13	gm/cc
Mud Density Type		
Mud Filtrate Density	1.00	gm/cc
Dry Hole Mud Filtrate Density	1.00	gm/cc
DNCT	0.00	gm/cc
CRCT	0.00	gm/cc
Density Z/A Correction	Hybrid	
Precision Enhanced Density Processing	Not Applied	
Matrix Density (gm/cc)	Depth (ft)	
2.71	3.22	

0.00
0.00
0.00
0.00
0.00
0.00
0.00
0.00

0.00
0.00
0.00
0.00
0.00
0.00
0.00

DOWNHOLE EQUIPMENT

C:\Minimus 18.01.5248\Data\Grand Mesa Crater Lake #1-8\Grand Mesa Crater Lake #1-8_001.dta

Cablehead, 11 pin

CBH-C 0 LG: 2.40 ft WT: 24.3 lb OD: 2.244 in

Compact Swivel Head Adaptor

SHA-J.B 724 LG: 2.30 ft WT: 22.0 lb OD: 2.244 in

Compact Comms Gamma

MCG-D.J 422 LG: 8.70 ft WT: 63.9 lb OD: 2.244 in

Compact Micro-Resistivity

MMR-B.A 91 LG: 8.59 ft WT: 81.6 lb OD: 4.882 in

Compact Neutron

MDN-B.A 292 LG: 5.04 ft WT: 50.7 lb OD: 2.244 in

Compact Density/Caliper

MPD-C.A 216 LG: 9.59 ft WT: 90.4 lb OD: 2.913 in

Compact Knuckle Joint

SKJ-D.A 167 LG: 2.17 ft WT: 24.3 lb OD: 2.244 in

Compact Focussed Electric

MFE-A.A 135 LG: 6.05 ft WT: 48.5 lb OD: 2.244 in

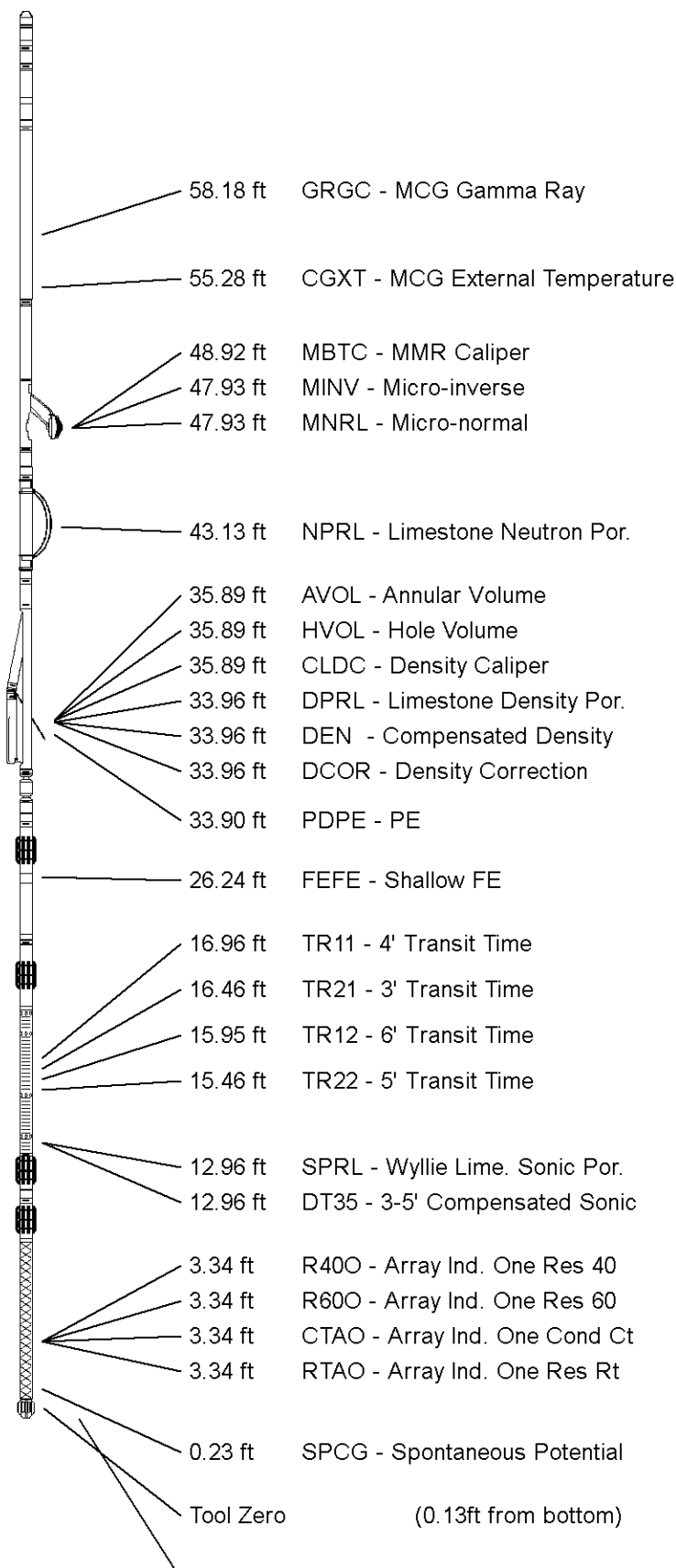
Compact Sonic

MSS-C.K 319 LG: 12.52 ft WT: 72.8 lb OD: 2.244 in

Compact Induction

MAI-A.A 111 LG: 10.81 ft WT: 48.5 lb OD: 2.244 in

Total Length: 68.16 ft Weight: 526.9 lb



All measurements relative to tool zero.

COMPANY	GRAND MESA OPERATING COMPANY
WELL	CRATER LAKE #1-8
FIELD	WILDCAT
PROVINCE/COUNTY	LINCOLN
COUNTRY/STATE	U.S.A. / COLORADO

Elevation Kelly Bushing	5423	feet	First Reading	8462.00	feet
Elevation Drill Floor	5421	feet	Depth Driller	8495.00	feet
Elevation Ground Level	5404	feet	Depth Logger	8496.00	feet



COMPACT PHOTO DENSITY
COMPENSATED NEUTRON
MICRORESISTIVITY LOG

Weatherford®